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ABSTRACT

This document provides a detailed outline of performance objectives and test items for an introductory secondary level earth science course. (SL)

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EARTH SCIENCE

PERFORMANCE OBJECTIVES AND TEST ITEMS

Science Behaviors Outline
Science Behaviors Description
Content Outline
Content/Objectives/Behaviors Grid
Performance Objectives and Test Items

First Revision

Compiled by
Mittie Coleman

Norfolk City Schools
July, 1973

SE 023 116

SCIENCE BEHAVIORS

Outline

COGNITIVE DOMAIN

A.0 KNOWLEDGE

- A.1 Knowledge of scientific terminology
- A.2 Knowledge of facts
- A.3 Knowledge of classification schemes
- A.4 Knowledge of scientific techniques and procedures
- A.5 Knowledge of scientific concepts, principles, laws, and theories

B.0 COMPREHENSION

- B.1 Translation of knowledge to a new form
- B.2 Identification of knowledge in a new context
- B.3 Interpretation of knowledge, including data and observations

C.0 APPLICATION

- C.1 Solution of routine mathematical problems
- C.2 Recognition and identification of a problem
- C.3 Observation of objects and phenomona
- C.4 Measurement of objects and change
- C.5 Collection and processing of data
- C.6 Application of knowledge in new situations

D.0 ANALYSIS AND SYNTHESIS

- D.1 Formulation of an hypothesis
- D.2 Selection of suitable tests for an hypothesis and appropriate procedures for performing experiments
- D.3 Formulation of generalizations based on data and observations

PSYCHOMOTOR DOMAIN

E.0 SKILLS

- E.1 Skills in the use of common laboratory and field equipment and techniques
- E.2 Skills in mounting and preserving specimens, and in constructing graphs, charts, drawings, models, and maps
- E.3 Skills in oral expression

AFFECTIVE DOMAIN

F.0 ATTITUDES, INTERESTS, APPRECIATIONS, AND VALUES

- F.1 Manifestation of favorable attitudes toward science and scientists
- F.2 Commitment to a value system and adoption of scientific attitudes and the methods of scientific inquiry
- F.3 Enjoyment of science learning experiences
- F.4 Development of interests in science and science-related activities
- F.5 Realization of the interrelationships among the sciences, the humanities, and society
- F.6 Recognition of the historical background of science

DESCRIPTION OF SCIENCE BEHAVIORS

COGNITIVE DOMAIN

A.0 KNOWLEDGE

A.1 Knowledge of scientific terminology

Correct use and definition of scientific vocabulary.

A.2 Knowledge of facts

Recall of specific facts; for example, insects have six legs.

A.3 Knowledge of classification schemes

Ordering objects and phenomona in accordance with organizing structures established by scientists. For example, (a) Matter is classified into gases, liquids, and solids. (b) Criteria for classifying insects are a three-part body and six legs.

A.4 Knowledge of scientific techniques and procedures

This is to be distinguished from students' manual performance of laboratory techniques (a psychomotor skill) and use of procedures. It would include being able to recall and describe (a) how to use a microscope, (b) how to perform a titration, (c) how to test for starch, (d) how to determine density, etc.

A.5 Knowledge of scientific concepts, principles, laws, and theories

The acquisition and recall of the above. For example, the concept of cycles (life cycles, the nitrogen cycle), Archimedes principle, Mendel's laws, the theory of evolution, the kinetic-molecular theory.

B.0 COMPREHENSION

Comprehension of a fact, classification scheme, procedure, principle or theory is demonstrated by the students' ability to make some use of the above kinds of knowledge.

B.1 Translation of knowledge to a new form

The ability to translate information and relationships expressed in symbolic form, including maps, tables, diagrams, charts, and formulas into verbal and numerical form and vice-versa. For example: (a) A definition of density may be stated as a formula $d=\frac{m}{v}$. (b) Written material may be read, summarized, and presented orally by the student. (c) A description of forces may be put into the form of a vector diagram. (d) Chemical equations may be translated into a verbal statement that the reactions are synthesis, replacement, etc. (e) A student may be able to transform an abstract idea into an example in everyday concrete terms or vice-versa. (f) Given the symbols, the student can explain their meaning on a weather map or a topological map or can construct such a map from given information.

B.2 Identification of knowledge in a new context

Examples: (a) Having learned the concept of cycle in relation to the water cycle, the student will identify the life stages of flowering plants from seed to seed as a cycle. (b) Having learned the criteria for classifying organisms as insects when studying honey bees, the student will recognize that grasshoppers are also insects. (c) Having learned that $A + B \rightarrow AB$ represents a synthesis reaction, the student will recognize that $C + O_2 \rightarrow CO_2$ is also a synthesis reaction.

B.3 Interpretation of knowledge, including data and observations

Interpretation involves understanding of interrelationships and recognizing inferences from information. For example: (a) A student examines a distance vs time graph and determines whether or not a moving body is accelerating. (b) A student extrapolates from a graph or chart to predict. (c) A student reads material and determines if the data or information support the conclusion given.

C.0 APPLICATION

Application goes beyond comprehension. When a student "comprehends", he *can* use an abstraction or idea when its use is specified; but a demonstration of "application" shows he *will* use it in an appropriate situation for which no mode of solution is specified. Comprehension does not certify the ability to apply. Application is the behavior used in the first steps of problem solving. It refers particularly to application of principles to new situations.

C.1 Solution of routine mathematical problems

For example: (a) Having learned the formula for density, the student calculates it from the measurements of mass and volume. (b) the student calculates weight of product in a chemical reaction when given weight of reactants.

C.2 Recognition and identification of a problem

To sense a problem the student must recognize some sort of discrepancy, incongruity, or unanswered question.

C.3 Observation of objects and phenomona

The student makes observations which are appropriate and correct and can accurately communicate them orally or in some recorded form. The observation is qualitative only; as soon as it goes beyond simple counting and becomes quantitative, the student behavior represents category C.4 Measurement.

C.4 Measurement of objects and changes

The student can select, and properly use the appropriate measurement instrument with consideration for such matters as how to read a meniscus, accuracy, precision, significant figures, interpolation, estimation, how frequently to record data, etc.

C.5 Collection and processing of data

This includes collecting relevant data, recording it properly, assembling it in appropriate charts, graphs, tables, drawings, models, or maps, making calculations if necessary (such as correcting for daily atmospheric pressure changes), and analyzing error. This category also includes properly preserving, mounting, and labelling collected specimens, because they are field data.

C.6 Application of knowledge in new situations

Examples: (a) The student can predict the probable effect of a change in one factor on a biological situation (e.g. aquarium) previously in equilibrium. (b) Experimental procedures and scientific principles are applied to making a home repair. (c) Mendel's laws are applied in designing an experiment on plant genetics. (d) Without being told why, a student applies the idea of expansion because of heating to explain why there are expansion joints in bridges and roads.

D.O ANALYSIS AND SYNTHESIS

D.1 Formulation of a hypothesis. The hypothesis will give direction to an investigation and lead to D.2.

D.2 Selection of suitable tests for an hypothesis and appropriate procedures for performing the experimental tests

The student selects tests which are indeed a valid test of a proposed hypothesis and selects or designs equipment and procedures so these tests can be implemented in an experiment. This behavior is not concerned with manipulative details, but with valid design of an experiment.

D.3 Formulation of generalizations based on data and observations

(a) The student analyzes data, develops relationships, indicates trends, determines whether or not the hypothesis is verified
(b) and/or, using analyzed information from a variety of sources, he synthesizes factors in order to formulate a generalization. Example: A written report of a field, lab, or literature investigation which concludes with the students' own generalization(s).

PSYCHOMOTOR DOMAIN

E.0 SKILLS

E.1 Skills in the use and care of common laboratory and field equipment and techniques

This category deals with manipulative and manual skills. Successful achievement calls for proper care of equipment and for techniques to be performed safely and with sufficient care to achieve good results.

E.2 Skills in mounting and preserving specimens, and constructing graphs, charts, drawings, models, and maps

This psychomotor skill is concerned only with the successful manual performance of constructing the above, with no requirement for knowledge, comprehension, or other cognitive abilities.

E.3 Skills in oral expression

This refers to the student's ability to make oral presentations or communications, but does not include cognitive abilities. For example, a student may be able to present an oral report to the class, speaking clearly and with poise; however the accuracy of material, the logic, relevance, or any other cognitive aspect of the report would not be considered in judging this skill.

AFFECTIVE DOMAIN

F.0 ATTITUDES, INTERESTS, AND APPRECIATIONS

Evaluation of achievement in the affective domain is most difficult. Frequently observation by the teacher is the only way to evaluate affective behavior. Checklists lend objectivity to such observations and provide a means of recording them. Other evaluation instruments are: (1) personal discussions and interviews, (2) individual inventories, (3) student reports or term papers, (4) rating scales, (5) subjective test questions.

F.1 Manifestation of favorable attitudes toward science and scientists

This attitude is evidenced when the student speaks, writes, and acts in ways which show he places a value on the role of science in furthering man's understanding and gives due acknowledgment to scientists for their contributions in this quest. He does not denounce science as a sinister enterprise or consider scientists to be wierd people.

F.2 Commitment to a value system and adoption of scientific attitudes and the methods of scientific inquiry

Commitment to a value system could be evidenced by a student who holds a value firmly enough to stand up and defend it or whose behavior manifests his values. For example, (a) he will not hesitate to support an issue which may be unpopular with his peers, (b) he will indicate a respect for all living things and the environment.

Scientific attitudes reflect the nature of scientific inquiry and professional standards of the scientist rather than the personalities of scientists. The attitudes include honesty, open-mindedness, self-criticism, willingness to suspend judgment, and commitment to accuracy. The student whose mind is attuned to the methods of inquiry is characterized by more than mechanical performance of inquiry processes; his behaviors attest that he is personally convinced that scientific inquiry is a valuable and valid operating mode for him.

He will apply the methods and behaviors typical of scientific inquiry to the resolution of everyday problems; for example, in deciding on purchases, making decisions regarding school, interpersonal relationships, and career choice He will perform tasks in a precise, orderly, well-organized fashion, will care properly for equipment he uses, and will work cooperatively within a group.

F.3 Enjoyment of science learning experiences

This category calls attention to an obviously desirable but frequently and sadly lacking aspect of school learning. The student who enjoys science learning will express his feelings clearly in words and in other ways. Teacher observations of such expressions must be employed to determine if the behavior indicates achievement of such an objective.

F.4 Development of interests in science and science-related activities

Two aspects of this interest are (a) activities the student does himself, particularly voluntarily, and (b) the attention he gives to ongoing science events and the societal interactions of science.

F.5 Realization of the interrelationships among the sciences, the humanities, and society

This category deals with the students' manifestations which indicate their awareness that (a) all sciences are interrelated, (b) the humanities and the sciences are interrelated and influence each other (science and music, art and science, etc.), (c) science influences society and vice-versa, (The attitude of government toward research funding; industrial and social needs vs. ecological considerations; etc.).

F.6 Recognition of the historical background of science

This refers to the history of scientific ideas and the evolutionary nature of their development, and students' recognition that the past, present, and future development of science is a reflection of the general culture of the time.

EARTH SCIENCE

Content

- 1.00 Introduction
  - 1.10 Overview
  - 1.20 Metric System

- 2.00 The Universe
  - 2.10 The Origin of the Universe
  - 2.20 Dynamic Nature of the Universe

- 3.00 Investigation of Distant Objects in Space
  - 3.10 Light
  - 3.20 Astronomical Instruments
  - 3.30 Space Travel

- 4.00 Stars and Star Groups
  - 4.10 Classification of Stars and Star Groups
  - 4.20 Measuring Objects in the Universe

- 5.00 The Solar System
  - 5.10 The Sun
  - 5.20 Other Members of the Solar System
  - 5.30 The Moon
  - 5.40 The Origin of the Solar System
  - 5.50 Astronomy - Time

- 6.00 Materials of the Earth's Surface
  - 6.10 Properties of the Lithosphere
  - 6.20 The Structure of Matter

- 7.00 Physical and Chemical Nature of Minerals
  - 7.10 Identifying Minerals by Physical Properties
  - 7.20 Special Tests Used for Mineral Identification
  - 7.30 Non-Metallic Minerals
  - 7.40 Metallic Minerals

- 8.00 Rocks and the Rock Cycle
  - 8.10 Rock Classification
  - 8.20 Igneous Rock
  - 8.30 Sedimentary Rock
  - 8.40 Metamorphic Rock

- 9.00 Maps and Map Reading
    - 9.10 Navigation
    - 9.20 Maps Used by Earth Scientist

- 10.00 Internal Forces That Shape the Earth
    - 10.10 Interior of the Earth
    - 10.20 Size and Shape of the Earth
    - 10.30 Diastrophism
    - 10.40 Landforms
    - 10.50 Extrusive Igneous Activity
    - 10.60 Intrusive Igneous Activity

- 11.00 The Forces That Sculpture the Earth's Surface
    - 11.10 Weathering and Erosion
    - 11.20 Soil
    - 11.30 Ground Water
    - 11.40 Running Water
    - 11.50 River Cycles
    - 11.60 Glaciers
    - 11.70 Wind Erosion and Deposition
    - 11.80 Shoreline Erosion and Deposition

- 12.00 The Hydrosphere
    - 12.10 The Hydrologic Cycle
    - 12.20 Lakes
    - 12.30 The Ocean
    - 12.40 Waves
    - 12.50 Ocean Currents
    - 12.60 Tides in the Ocean

- 13.00 The Atmosphere
    - 13.10 Characteristics of Atmosphere
    - 13.20 Factors Influencing Atmosphere

- 14.00 Climate
    - 14.10 Terminology and Problems
    - 14.20 Composition of the Atmosphere
    - 14.30 Effect of the Sun On the Atmosphere
    - 14.40 Water Balance in the Atmosphere
    - 14.50 Formation of Clouds
    - 14.60 Precipitation
    - 14.70 Air Pollution
    - 14.80 Circulation in the Atmosphere
    - 14.90 Weather

- 15.00 The Record of the Earth's History
    - 15.10 Determining Geologic Age
    - 15.20 Geologic Time Chart

EARTH SCIENCE

Content/Behaviors Grid

		SCIENCE BEHAVIORS																									
		Cognitive																	*Psycho-motor*			*Affective*					
		Knowledge					*Comprehension*			*Application*						*Analysis, Synthesis*			*Skills*			*Attitude/Interest Appreciation/Valu*					
		Terminology	*Facts*	*Classification*	*Techniques/Procedures*	*Concepts/Laws/Theories*	*Translation to New Form*	*Identify Knowledge in New Context*	*Interpretation*	*Solve Math Problems*	*Recognize/Ident. Probl.*	*Observation*	*Measurement*	*Collect/Process Data*	*Apply Knowledge in New Situation*	*Formulate Hypothesis*	*Select Tests of Hypothesis and Procedures*	*Formulate Generalizations*	*Equipment and Techniques*	*Construction of Graphs, Models, Mounts, etc.*	*Oral Expression*	*Attitudes toward Science*	*Values, Scientific Attitudes and Methods*	*Enjoyment of Science*	*Interest in Science*	*Interrelationships - Sci/Humanities/Soc*	*Historical Background*
CONTENT	*OBJECTIVE*	*A 1*	*A 2*	*A 3*	*A 4*	*A 5*	*B 1*	*B 2*	*B 3*	*C 1*	*C 2*	*C 3*	*C 4*	*C 5*	*C 6*	*D 1*	*D 2*	*D 3*	*E 1*	*E 2*	*E 3*	*F 1*	*F 2*	*F 3*	*F 4*	*F 5*	*F 6*
1.00 Introduction																											
1.10 Overview	A.1/1.10a	X																									
	A.3/1.10b			X																							
	A.1/1.10c	X																									
	A.4/1.10d				X																						
	B.2/1.10e							X																			
	A.3/1.10f			X																							
	D.2/1.10g																X										
1.20 Metric System	A.4/1.20a				X																						
	C.4/1.20b												X														
2.00 The Universe																											
2.10 The Origin of the Universe	D.3/2.10a																	X									
	A.4/2.10b				X																						
2.20 Dynamic Nature of the Universe	A.1/2.20a	X																									
	A.4/2.20b				X																						
3.00 Investigation of Distant Objects in Space																											
3.10 Light	A.4/3.10a				X																						
	E.2/3.10b																			X							
	C.4/3.10c												X														

EARTH SCIENCE

Content/Behaviors Grid

		SCIENCE BEHAVIORS																							
		Cognitive																	Psychomotor			Affective					
		Knowledge					Comprehension			Application						Analysis, Synthesis			Skills			Attitude/Interest Appreciation/Value					
		Terminology	Facts	Classification	Techniques/Procedures	Concepts/Laws/Theories	Translation to New Form	Identify Knowledge in New Context	Interpretation	Solve Math Problems	Recognize/Ident. Probl.	Observation	Measurement	Collect/Process Data	Apply Knowledge in New Situation	Formulate Hypothesis	Select Tests of Hypothesis and Procedures	Formulate Generalizations	Equipment and Techniques	Construction of Graphs, Models, Mounts, etc.	Oral Expression	Attitudes toward Science	Values, Scientific Attitudes and Methods	Enjoyment of Science	Interest in Science	Interrelationships - Sci/Humanities/Soc	Historical Background
CONTENT	OBJECTIVE	A 1	A 2	A 3	A 4	A 5	B 1	B 2	B 3	C 1	C 2	C 3	C 4	C 5	C 6	D 1	D 2	D 3	E 1	E 2	E 3	F 1	F 2	F 3	F 4	F 5	F 6
3.20 Astronomical Instruments	E.1/3.20a																		X								
	A.4/3.20b				X																						
3.30 Space Travel	E.3/3.30a																				X						
	D.3/3.30b																	X									
	D.3/3.30c																	X									
4.00 Stars and Star Groups																											
4.10 Classification of Stars and Star Groups																											
	A.3/4.10a			X																							
	A.4/4.10b				X																						
	E.2/4.10c																			X							
4.20 Measuring Objects in the Universe																											
	E.1/4.20a																		X								
	C.6/4.20b														X												
	D.3/4.20c																	X									
5.00 The Solar System																											
5.10 The Sun	E.2/5.10a																			X							
	C.6/5.10b														X												
	C.6/5.10c														X												
5.20 Other Members of the Solar System																											
	A.4/5.20a				X																						
	E.1/5.20b																		X								
	D.3/5.20c																	X									
	E.2/5.20d																			X							

EARTH SCIENCE

Content/Behaviors Grid

SCIENCE BEHAVIORS

CONTENT	OBJECTIVE	Terminology A1	Facts A2	Classification A3	Techniques/Procedures A4	Concepts/Laws/Theories A5	Translation to New Form B1	Identify Knowledge in New Context B2	Interpretation B3	Solve Math Problems C1	Recognize/Ident. Probl. C2	Observation C3	Measurement C4	Collect/Process Data C5	Apply Knowledge in New Situation C6	Formulate Hypothesis D1	Select Tests of Hypothesis and Procedures D2	Formulate Generalizations D3	Equipment and Techniques E1	Construction of Graphs, Models, Mounts, etc. E2	Oral Expression E3	Attitudes toward Science F1	Values, Scientific Attitudes and Methods F2	Enjoyment of Science F3	Interest in Science F4	Interrelationships - Sci/Humanities/Soc F5	Historical Background F6
		Cognitive																	Psycho-motor			Affective					
		Knowledge					Compre-hension			Application						Analysis, Synthesis			Skills			Attitude/Interest Appreciation/Value					
5.30 The Moon	A.4/5.30a				X																						
	E.2/5.30b																			X							
	B.1/5.30c						X																				
	E.1/5.30d																		X								
	C.6/5.30e														X												
5.40 The Origin of the Solar System																											
	D.3/5.40a																	X									
5.50 Astronomy - Time	E.1/5.50a																		X								
	E.1/5.50b																		X								
6.00 Materials of the Earth's Surface																											
6.10 Properties of the Lithosphere																											
	A.3/6.10a			X																							
	A.2/6.10b		X																								
6.20 The Structure of Matter	D.3/6.20a																	X									
	E.2/6.20b																			X							
	B.2/6.20c							X																			
	A.3/6.20d			X																							
	A.4/6.20e				X																						
7.00 Physical and Chemical Nature of Minerals																											
7.10 Identifying Minerals by Physical Properties																											
	A.1/7.10a	X																									

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Content/Behaviors Grid

SCIENCE BEHAVIORS

		Cognitive																	Psychomotor			Affective					
		Knowledge					Comprehension			Application						Analysis, Synthesis			Skills			Attitude/Interest Appreciation/Value					
		Terminology	Facts	Classification	Techniques/Procedures	Concepts/Laws/Theories	Translation to New Form	Identify Knowledge in New Context	Interpretation	Solve Math Problems	Recognize/Ident. Probl.	Observation	Measurement	Collect/Process Data	Apply Knowledge in New Situation	Formulate Hypothesis	Select Tests of Hypothesis and Procedures	Formulate Generalizations	Equipment and Techniques	Construction of Graphs, Models, Mounts, etc.	Oral Expression	Attitudes toward Science	Values, Scientific Attitudes and Methods	Enjoyment of Science	Interest in Science	Interrelationships - Sci/Humanities/Soc	Historical Background
CONTENT	*OBJECTIVE*	A 1	A 2	A 3	A 4	A 5	B 1	B 2	B 3	C 1	C 2	C 3	C 4	C 5	C 6	D 1	D 2	D 3	E 1	E 2	E 3	F 1	F 2	F 3	F 4	F 5	F 6
7.20 Special Tests Used for Mineral Identification	E.1/7.20a																		X								
	A.3/7.20b			X																							
	A.2/7.20c		X																								
7.30 Non-Metallic Minerals	A.4/7.30a				X																						
	E.2/7.30b																			X							
7.40 Metallic Minerals	A.2/7.40a		X																								
	A.3/7.40b			X																							
8.00 Rocks and the Rock Cycle																											
8.10 Rock Classification	B.1/8.10a						X																				
	A.3/8.10b			X																							
	D.3/8.10c																	X									
8.20 Igneous Rock	B.2/8.20a							X																			
	E.1/8.20b																		X								
	A.4/8.20c				X																						
8.30 Sedimentary Rock	A.4/8.30a				X																						
	D.3/8.30b																	X									
	E.1/8.30c																		X								
8.40 Metamorphic Rock	A.2/8.40a		X																								
	A.2/8.40b		X																								
	E.2/8.40c																			X							
9.00 Maps and Map Reading																											
9.10 Navigation	B.2/9.10a							X																			
	E.1/9.10b																		X								

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CONTENT	OBJECTIVE	A 1	A 2	A 3	A 4	A 5	B 1	B 2	B 3	C 1	C 2	C 3	C 4	C 5	C 6	D 1	D 2	D 3	E 1	E 2	E 3	F 1	F 2	F 3	F 4	F 5	F 6
9.20 Maps Used by Earth Scientists																											
	B.1/9.20a						X																				
	E.2/9.20b																			X							
10.00 Internal Forces That Shape The Earth																											
10.10 Interior of the Earth	A.4/10.10a				X																						
	A.4/10.10b				X																						
	E.1/10.10c																		X								
10.20 Size and Shape of the Earth																											
	E.1/10.20a																		X								
	E.2/10.20b																			X							
	C.4/10.20c												X														
10.30 Diastrophism	A.1/10.30a	X																									
	A.3/10.30b			X																							
	A.2/10.30c		X																								
	A.3/10.30d			X																							
	B.3/10.30e								X																		
10.40 Landforms	A.4/10.40a				X																						
	C.6/10.40b														X												
	B.3/10.40c								X																		
	D.1/10.40d															X											
	E.3/10.40e																				X						
	A.1/10.40f	X																									

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		SCIENCE BEHAVIORS																									
		Cognitive																	Psycho-motor			Affective					
		Knowledge					Compre-hension			Application						Analysis, Synthesis			Skills			Attitude/Interest Appreciation/Value					
CONTENT	OBJECTIVE	Terminology A 1	Facts A 2	Classification A 3	Techniques/Procedures A 4	Concepts/Laws/Theories A 5	Translation to New Form B 1	Identify Knowledge in New Context B 2	Interpretation B 3	Solve Math Problems C 1	Recognize/Ident. Probl. C 2	Observation C 3	Measurement C 4	Collect/Process Data C 5	Apply Knowledge in New Situation C 6	Formulate Hypothesis D 1	Select Tests of Hypothesis and Procedures D 2	Formulate Generalizations D 3	Equipment and Techniques E 1	Construction of Graphs, Models, Mounts, etc. E 2	Oral Expression E 3	Attitudes toward Science F 1	Values, Scientific Attitudes and Methods F 2	Enjoyment of Science F 3	Interest in Science F 4	Interrelationships - Sci/Humanities/Soc F 5	Historical Background F 6
10.50 Extrusive Igneous Activity																											
	A.2/10.50a		X																								
	B.1/10.50b						X																				
	B.1/10.50c						X																				
10.60 Intrusive Igneous Activity																											
	B.1/10.60a						X																				
11.00 The Forces That Sculpture the Earth's Surface																											
11.10 Weathering and Erosion	B.2/11.10a							X																			
	B.3/11.10b								X																		
	D.2/11.10c																X										
	B.3/11.10d								X																		
11.20 Soil	A.3/11.20a			X																							
	B.1/11.20b						X																				
	A.3/11.20c			X																							
11.30 Ground Water	A.2/11.30a		X																								
11.40 Running Water	C.6/11.40a														X												
11.50 River Cycles	A.4/11.50a				X																						
	A.4/11.50b				X																						
11.60 Glaciers	D.3/11.60a																	X									
	D.3/11.60b																	X									
	E.2/11.60c																			X							

EARTH SCIENCE

Content/Behaviors Grid

SCIENCE BEHAVIORS

		Cognitive																	*Psycho-motor*			*Affective*					
		Knowledge					*Compre-hension*			*Application*						*Analysis, Synthesis*			*Skills*			*Attitude/Interest Appreciation/Value*					
		Terminology	*Facts*	*Classification*	*Techniques/Procedures*	*Concepts/Laws/Theories*	*Translation to New Form*	*Identify Knowledge in New Context*	*Interpretation*	*Solve Math Problems*	*Recognize/Ident. Probl.*	*Observation*	*Measurement*	*Collect/Process Data*	*Apply Knowledge in New Situation*	*Formulate Hypothesis*	*Select Tests of Hypothesis and Procedures*	*Formulate Generalizations*	*Equipment and Techniques*	*Construction of Graphs, Models, Mounts, etc.*	*Oral Expression*	*Attitudes toward Science*	*Values, Scientific Attitudes and Methods*	*Enjoyment of Science*	*Interest in Science*	*Interrelationships - Sci/Humanities/Soc*	*Historical Background*
CONTENT	*OBJECTIVE*	*A 1*	*A 2*	*A 3*	*A 4*	*A 5*	*B 1*	*B 2*	*B 3*	*C 1*	*C 2*	*C 3*	*C 4*	*C 5*	*C 6*	*D 1*	*D 2*	*D 3*	*E 1*	*E 2*	*E 3*	*F 1*	*F 2*	*F 3*	*F 4*	*F 5*	*F 6*
11.70 Wind Erosion and Deposition																											
	A.5/11.70a					X																					
	E.1/11.70b																		X								
11.80 Shoreline Erosion and Deposition																											
	A.1/11.80a	X																									
	E.2/11.80b																			X							
12.00 The Hydrosphere																											
12.10 The Hydrologic Cycle	B.2/12.10a							X																			
	A.4/12.10b				X																						
	A.2/12.10c		X																								
	A.2/12.10d		X																								
12.20 Lakes	A.4/12.20a				X																						
	A.4/12.20b				X																						
12.30 The Ocean	A.2/12.30a		X																								
	E.3/12.30b																				X						
	E.1/12.30c																		X								
	A.3/12.30d			X																							
12.40 Waves	B.1/12.40a						X																				
	A.1/12.40b	X																									
	D.3/12.40c																	X									
12.50 Ocean Currents	D.3/12.50a																	X									
	E.2/12.50b																			X							
12.60 Tides in the Ocean	E.2/12.60a																			X							
	D.3/12.60b																	X									

EARTH SCIENCE

Content/Behaviors Grid

			SCIENCE BEHAVIORS																									
			Cognitive																	Psycho-motor			Affective					
			Knowledge					Compre-hension			Application						Analysis, Synthesis			Skills			Attitude/Interest Appreciation/Valu					
			Terminology	Facts	Classification	Techniques/Procedures	Concepts/Laws/Theories	Translation to New Form	Identify Knowledge in New Context	Interpretation	Solve Math Problems	Recognize/Ident. Probl.	Observation	Measurement	Collect/Process Data	Apply Knowledge in New Situation	Formulate Hypothesis	Select Tests of Hypothesis and Procedures	Formulate Generalizations	Equipment and Techniques	Construction of Graphs, Models, Mounts, etc.	Oral Expression	Attitudes toward Science	Values, Scientific Attitudes and Methods	Enjoyment of Science	Interest in Science	Interrelationships - Sci/Humanities/Soc	Historical Background
	CONTENT	OBJECTIVE	A 1	A 2	A 3	A 4	A 5	B 1	B 2	B 3	C 1	C 2	C 3	C 4	C 5	C 6	D 1	D 2	D 3	E 1	E 2	E 3	F 1	F 2	F 3	F 4	F 5	F 6
13.00	The Atmosphere																											
13.10	Characteristics of Atmosphere	A.1/13.10a	X																									
		A.2/13.10b		X																								
13.20	Factors Influencing Atmosphere	E.1/13.20a																		X								
		C.3/13.20b											X															
		C.6/13.20c														X												
14.00	Climate																											
14.10	Terminology and Problems	A.1/14.10a	X																									
		C.5/14.10b													X													
14.20	Composition of the Atmosphere	E.1/14.20a																		X								
		A.5/14.20b					X																					
		D.3/14.20c																	X									
14.30	Effect of the Sun on the Atmosphere	B.1/14.30a						X																				
14.40	Water Balance in the Atmosphere	E.1/14.40a																		X								
		B.3/14.40b								X																		
14.50	Formation of Clouds	A.2/14.50a		X																								
		B.3/14.50b								X																		

EARTH SCIENCE

Content/Behaviors Grid

		SCIENCE BEHAVIORS																									
		Cognitive																	*Psychomotor*			*Affective*					
		Knowledge					*Comprehension*			*Application*						*Analysis, Synthesis*			*Skills*			*Attitude/Interest Appreciation/Valu*					
		Terminology	*Facts*	*Classification*	*Techniques/Procedures*	*Concepts/Laws/Theories*	*Translation to New Form*	*Identify Knowledge in New Context*	*Interpretation*	*Solve Math Problems*	*Recognize/Ident. Probl.*	*Observation*	*Measurement*	*Collect/Process Data*	*Apply Knowledge in New Situation*	*Formulate Hypothesis*	*Select Tests of Hypothesis and Procedures*	*Formulate Generalizations*	*Equipment and Techniques*	*Construction of Graphs, Models, Mounts, etc.*	*Oral Expression*	*Attitudes toward Science*	*Values, Scientific Attitudes and Methods*	*Enjoyment of Science*	*Interest in Science*	*Interrelationships - Sci/Humanities/Soc*	*Historical Background*
CONTENT	*OBJECTIVE*	*A 1*	*A 2*	*A 3*	*A 4*	*A 5*	*B 1*	*B 2*	*B 3*	*C 1*	*C 2*	*C 3*	*C 4*	*C 5*	*C 6*	*D 1*	*D 2*	*D 3*	*E 1*	*E 2*	*E 3*	*F 1*	*F 2*	*F 3*	*F 4*	*F 5*	*F 6*
14.60 Precipitation	A.4/14.60a				X																						
14.70 Air Pollution	D.3/14.70a																	X									
14.80 Circulation in the Atmosphere																											
	A.3/14.80a			X																							
	E.1/14.80b																		X								
	C.6/14.80c														X												
14.90 Weather	A.2/14.90a		X																								
	B.3/14.90b								X																		
	D.3/14.90c																	X									
	D.3/14.90d																	X									
15.00 The Record of the Earth's History																											
15.10 Determining Geologic Age																											
	B.3/15.10a								X																		
	A.4/15.10b				X																						
	D.3/15.10c																	X									
15.20 Geologic Time Chart	D.3/15.20a																	X									
	A.4/15.20b				X																						

EARTH SCIENCE

1.00 UNIT: INTRODUCTION

1.10 Topic: Overview

Objectives (**Minimum Objectives)*	*Activities*	*References*
*A.1/1.10a The student will be able to formulate and write definitions for the terms "science" and "earth science".		
*A.3/1.10b The student will display his understanding of the use of the textbook through activities involving the Table of Contents, Glossary and Index.		
*A.1/1.10c Given a list of the branches of Science and their definitions, the student will be able to match the branch of science to the meaning.		
*A.4/1.10d The student will be able to display his ability to identify and distinguish between common science tools in the classroom.		
*B.2/1.10e The student will be able to compare in writing the following terms: theory, fact, evidence, proof, law, belief, hypothesis and assumption.		
*A.3/1.10f Given a list of steps necessary in problem solving, the student will be able to list them in sequential order.		
*D.2/1.10g The student will be able to carry out an experiment following the scientific method as demonstrated by his ability to use a control, gather necessary material, record all pertinent data and offer conclusions.		

EARTH SCIENCE

1.00 UNIT: INTRODUCTION
1.10 Topic: Overview

Subtopic/Specifications/Content Number — *Test Item*

A.1/1.10a 1. Define the term science. Apply your definition to the earth sciences.

Subordinate Test Items

1. Define the following terms:
   - a. Science
   - b. Superstition

2. List the following:
   - a. Two reasons for studying science
     - 1. ____________________
     - 2. ____________________
   - b. Two ways scientists gather information
     - 1. ____________________
     - 2. ____________________

A.3/1.10b No test items submitted.

A.1/1.10c 1. Match the science with its subject:

_____ 1. Astronomy
_____ 2. Biology
_____ 3. Botany
_____ 4. Zoology
_____ 5. Geology
_____ 6. Meteorology
_____ 7. Oceanography
_____ 8. Paleontology
_____ 9. Geomorphology
_____ 10. Seismology
_____ 11. Physics
_____ 12. Cytology
_____ 13. Bacteriology
_____ 14. Anthropology
_____ 15. Geology

2. To solve this WORD PUZZLE, Branches of Science, look at the definitions on page 2. Think of a word which fits the definition from the words listed. It must have the same number of letters as the spaces provided in the corresponding line, and has the given letter in the same position as indicated. Print the word in the line.
NOTE: The teacher will provide the appropriate Puzzle Sheet.

EARTH SCIENCE

1.00 UNIT: INTRODUCTION
1.10 Topic: Overview

Subtopic/Specifications/Content Number *Test Item*

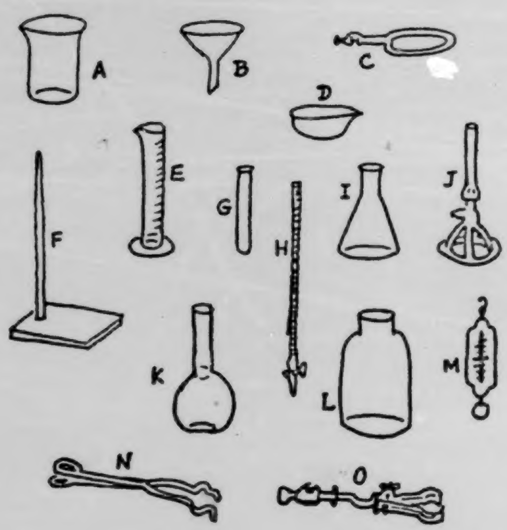
A.4/1.10d 1. On one table place 10 science tools (numbering them 1-10) beakers, cylinder, burner, ring stand, balance, test tubes and holders, eye dropper, goggles, meter stick, etc. Each student should identify each tool and give its function.

2. Each student is given a handout of the basic laboratory equipment to be kept in his or her notebook. Later, (2 or 3 days) the real equipment is shown. Then the student has to identify the equipment with or without the sheet.

3. Which of the following is not a tool that you would find in the lab? (a) filter, (b) cylinder, (c) wrench, (d) bunsen burner.

4. Match the capital letter with word which identifies it:

_____ 1. Collection bottle
_____ 2. ring
_____ 3. funnel
_____ 4. test tube
_____ 5. beaker
_____ 6. burette clamp
_____ 7. spring balance
_____ 8. erlenmeyer flask
_____ 9. graduated cylinder
_____ 10. watch glass
_____ 11. thermometer
_____ 12. tongs
_____ 13. ring stand
_____ 14. florence flask
_____ 15. bunsen burner



EARTH SCIENCE

1.00 UNIT: INTRODUCTION

1.10 Topic: Overview

Subtopic/Specifications/Content Number — *Test Item*

B.2/1.10e 1. Match the statements on the right with the words on the left. Use number answers.

_____	1.	Law of Science	1.	an educated guess
_____	2.	Meter	2.	unit of volume in the International system of units.
_____	3.	Scientific attitude	3.	a statement that has been proven true.
_____	4.	Liter	4.	is a particular way of thinking
_____	5.	Gram	5.	an idea that has not been proven true by experimentation
_____	6.	Fact	6.	unit of measurement of length in the International system of units.
_____	7.	Hypothesis	7.	to take for granted
_____	8.	Assumption	8.	proof of a happening or an event occuring
_____	9.	Evidence	9.	unit of mass in the International System of units
_____	10.	Theory	10.	a rule of science based on mathematical proof

2. The major difference between a theory and a fact is (a) the theory is a proven statement, (b) there is not difference, (c) a theory is easier to prove, (d) a theory is an educated guess.

A.3/1.10f 1. Below are listed the 6 steps in solving problems scientifically. Beside each statement, write a number (1-6) to denote whether it is step 1, 2, 3, 4, 5, or 6.

Get the facts
Reach a trial conclusion
Test the facts
Know what the problem is
Reach a trial conclusion
Keep an open mind

2. Based on the film "Using the Scientific Method", number the following steps in the scientific method in the order that they should be done.

_____ a. Form the hypothesis or trial answer
_____ b. Define the problem
_____ c. Test the trial answer or hypothesis
_____ d. Revise the answer and test again
_____ e. collect information

EARTH SCIENCE

1.00 UNIT: INTRODUCTION
1.10 Topic: Overview

Subtopic/Specifications/Content Number	Test Item

3. From the above statements write the six main steps in solving a problem by the Scientific Method:
1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________

Subordinate Test Item

1. After identifying a scientific problem, one must (record data, gather information, draw final conclusion, experiment).

D.2/1.10g 1. Select a problem that you'd like to solve using the scientific attitude. Discuss ways in which you would attempt to solve it using the 6 steps of the scientific approach. You may select a problem from the list on the back or make up your own problem.

Suggestions:

a. making a German chocolate cake
b. buying a new sweater
c. running an add in the newspaper
d. planning a strategy for your team's next football game
e. buying a car
f. looking for a job

Subordinate Test Item

1. You have been selected to work on a special science team to study the population of sea gulls in the Norfolk area. List the steps you would follow in order to solve the problem.

1.00 UNIT: INTRODUCTION

1.20 Topic: Metric System

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.4/1.20a	Students will be able to identify the following metric units according to numerical value and what the unit measures: Meter, centimeter, gram, kilogram, liter and milliliter.		
*C.4/1.20b	From these metric units, meter, centimeter, gram, kilogram, liter and milliliter, the student will make simple measurements using the proper metric unit for the proper measurement.		

EARTH SCIENCE

1.00 UNIT: INTRODUCTION
1.20 Topic: Metric System

Subtopic/Specifications/Content Number *Test Item*

C.4/1.20b 1. How many inches of material would you be buying if you bought 254 centimeters? (a) 1, (b) 200, (c) 100, (d) 10.

2. If you were in Germany and you were going 20 Kilometers how many miles would that be? (a) 12.40, (b) 16, (c) 24.8, (d) 120.

3. If you need a gallon of milk how many liters would you order? (a) 1, (b) 2, (c) 3, (d) 4.

4. If you were to go to the store to buy 1,363 grams of hamburger how many pounds would you get? (a) 50, (b) 10, (c) 3, (d) 100.

5. If you bought a ham weighing 5 kilograms how many pounds would you be getting? (a) 5, (b) 3, (c) 10, (d) 11.

6. If you were 6 feet tall how many centimeters tall would you be?

7. If you bought 5 kilograms of meat how many pounds would you be buying?

8. If you were told to take 10cc of medicine how many milliliters would that be?

2.00 UNIT: THE UNIVERSE

2.10 Topic: The Origin of the Universe

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*D.3/2.10a	Given several theories concerning the origin of the universe, the student will be able to select the one he feels is most logical and support it.		
*A.4/2.10b	Given a list of early explorers of the universe, the student will be able to give the contributions of each in relationship to the time in which he lived.		

2.00 UNIT: THE UNIVERSE

2.10 Topic: The Origin of the Universe

Subtopic/Specifications/Content Number *Test Item*

D.3/2.10a 1. Of these two hypothesis, "the Big Bang" theory and "the Pulsating Universe" concerning the origin of the universe, which do you agree with most? Support your choice.

Subordinate Test Items

1. Multiple Choice: Select the words or phrase that answers the statement correctly.
   The theory concerning the creation of the universe which states "as galaxies move away from each other, new galaxies are continuously being formed" is called the
   - a. Big Bang theory
   - b. "Steady State" theory
   - c. Expanding theory
   - d. Contraction theory

2. Matching:
   1. Ptolemy
   2. The Expanding Universe Theory
   3. The Big Bang Theory
   4. Nicholas Copernicus
   5. The Steady State Theory
   6. Galileo
   7. Radar
   8. Doppler effect
   9. Variable Stars
   10. Nebulae

   - a. radio detection and ranging
   - b. Stars that expand and contract
   - c. Proposed that the sun was the center of the universe
   - d. Developed the first crude telescope
   - e. Reveals the motion of stars
   - f. Proposed that the earth was the center of the universe
   - g. States that everything in space is moving away from one point
   - h. States that new galaxies are being created continuously
   - i. Numbers of dust clouds and gas clouds included in a galaxy
   - j. States that a big clump of matter exploded

A.4/2.10b 1. From the list of early explorers given, describe what each contributed to the study of astronomy in his own time.
- a. Eratosthenes (275-192 B.C.)
- b. Nicholas Copernicus (1473-1543)
- c. Tycho Brahe (1546-1601)
- d. Johannes Kepler (1571-1630)
- e. Sir Isaac Newton (1642-1727)

2.00 UNIT: THE UNIVERSE
2.10 Topic: The Origin of the Universe

Subtopic/Specifications/Content Number *Test Item*

2. Write one sentence about the contribution of any two of the scientists listed below:
   a. Galileo
   b. Ptolemy
   c. Isaac Newton
   d. Nicholaus Copernicus
   e. Albert Einstein
   f. Kepler

Subordinate Test Items

1. How did Kepler and Galileo differ in their views about the earth orbit around the sun?

2. Ptolemy's ePicycle was the situation where
   a. a planet would make circles in the sky
   b. a planet would revolve around the sun rather than the earth
   c. a planet would revolve in a figure eight
   d. a planet would revolve around a point in space that revolved around the earth

2.00 UNIT: THE UNIVERSE

2.20 Topic: Dynamic Nature of the Universe

Objectives *(*Minimum Objectives)*	*Activities*	*References*
*A.4/2.20a Given a list of instruments used to study the universe, the student will be able to identify each by name and tell what it is used for.		
*A.1/2.20b The student will be able to define: gravity, magnetism, rotation, revolution, nuclear fission, and nuclear fusion.		

2.00 UNIT: THE UNIVERSE
2.20 Topic: Dynamic Nature of the Universe

Subtopic/Specifications/Content Number *Test Item*

A.4/2.20a 1. List and briefly describe 3 types of telescopes.

2. Match the astronomer's instrument with its use:

1. chronograph
2. photometer
3. transit
4. thermocouple
5. spectroscope

a. temperature
b. light intensity
c. elements
d. angles
e. time

3. The instrument used to analyze starlight and determine what elements are in the star is the (a) photometer, (b) spectroscope, (c) coronograph, (d) oscilloscope.

4. What instrument would an astronomer use to find out what elements make up a heavenly body? (a) coronograph, (b) spectroscope, (c) chronograph, (d) satellite.

A.1/2.20b 1. Word Puzzle. Fill in the word that fits the definition below:

1. G _ _ _ _ _ _	1. force that pulls all bodies on or near earth toward center
2. M _ _ _ _ _ _ _ _	2. attractions of two bodies
3. R _ _ _ _ _ _ _	3. spinning action of a heavenly body in space
4. R _ _ _ _ _ _ _ _ _	4. motion of a planet in its orbit around the sun
5. N _ _ _ _ _ _ F _ _ _ _ _	5. atoms are changed to new atoms by heat; it is the process used in the hydrogen bomb.

2. The attraction of one body to another would be (a) gravity, (b) rotation, (c) revolution, (d) fission.

3.00 UNIT: INVESTIGATION OF DISTANT OBJECTS IN SPACE

3.10 Topic: Light

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.4/3.10a	The student will be able to describe the characteristics of light waves.		
*E.2/3.10b	The student will construct a chart showing the visible colors of a spectrum in proper sequence.		
*C.4/3.10c	The student will solve the following problems: How far does light travel in one hour, one day, one year?		

EARTH SCIENCE

3.00 UNIT: INVESTIGATION OF DISTANT OBJECTS IN SPACE
3.10 Topic: Light

Subtopic/Specifications/Content Number *Test Item*

A.4/3.10a 1. If the two words in each of the following groups are alike or related, write "R" in the space before the words. If they are different or unrelated, write "D" in the blank. Explain each answer.

_____ a. short wavelength - radar _____________________________
_____ b. spectrum - elements _____________________________
_____ c. Doppler effect - wave motion _____________________________
_____ d. long wavelength - radio astronomy _____________________________
_____ e. light - radio waves _____________________________

2. As wave frequencies get lower, the wave length becomes (a) shorter, (b) remains the same, (c) longer, (d) gets shorter then longer.

Subordinate Test Item

1. We use the Doppler Effect or Shift to measure distance to galaxies, and the greater the shift toward the red end of the spectrum, the -
   a. nearer the galaxy
   b. farther away the galaxy
   c. it remains more stationary
   d. none of the above

E.2/3.10b Complete the chart below showing the visible colors in sequence observed from a spectrum in a prism.

Color 1	Color 2	Color 3	Color 4	Color 5	Color 6	Color 7

From the longest wave length ⟶ to the shortest wave length

C.4/3.10c 1. If light travels 186,000 mi./sec how far to the nearest star (outside of solor system) which is 3.8 light-years away? (distance in mi.)

2. Show by math how far away the sun is if it takes 8 minutes 20 seconds for its light to get to the earth.

3. In eight years light would travel (a) 48 trillion miles, (b) 186,000 miles, (c) 6,000,000,000,000 miles, (d) 32 billion miles.

3.00 UNIT: INVESTIGATION OF DISTANT OBJECTS IN SPACE

3.20 Topic: Astronomical Instruments

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
E.1/3.20a	With the use of mirrors, the student will demonstrate reflection and refraction.		
*A.4/3.20b	The student will be able to identify astronomical instruments and tell what each measures.		

3.00 UNIT: INVESTIGATION OF DISTANT OBJECTS IN SPACE
3.20 Topic: Astronomical Instruments

Subtopic/Specifications/Content Number	*Test Item*
E.1/3.20a	Subordinate Test Items 1. From your laboratory experiments, state the difference between refraction and reflection. 2. List and draw two types of lenses.
A.4/3.20b	No test items submitted.

3.00 UNIT: INVESTIGATION OF DISTANT OBJECTS IN SPACE

3.30 Topic: Space Travel

Objectives *(*Minimum Objectives)*	*Activities*	*References*
E.3/3.30a The student will be able to discuss the problems involved in space travel from "lift-off" to "splash-down".		
D.3/3.30b The student will be able to explain how gravity and magnetism influence space travel.		
D.3/3.30c The student will be able to explain the effect of space exploration on our lives in at least four ways.		

3.00 UNIT: INVESTIGATION OF DISTANT OBJECTS IN SPACE

3.30 Topic: Space Travel

Subtopic/Specifications/Content Number	*Test Item*
E.3/3.30a	No test item submitted.
D.3/3.30b	No test item submitted.
D.3/3.30c	No test item submitted.

4.00 UNIT: STARS AND STAR GROUPS

4.10 Topic: Classification of Stars and Star Groups

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.3/4.10a	The student will classify stars according to: age, magnitude, stage of development, and temperature.		
*A.4/4.10b	The student will demonstrate his knowledge of the kinds of galaxies by identifying them in various ways.		
E.2/4.10c	The student will construct three constellations using gummed stars on construction paper. The constellations must be named and the location for each must be designated for a given month of the year.		

4.00 UNIT: STARS AND STAR GROUPS

4.10 Topic: Classification of Stars and Star Groups

Subtopic/Specifications/Content Number *Test Item*

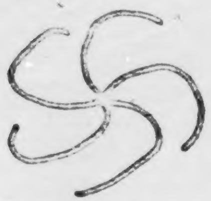
A.3/4.10a 1. Fill in the missing star color or temperature on the chart below

Color	Temperature
Blue-White	
	8,000° F
	6,000 - 8,000° F
Red	

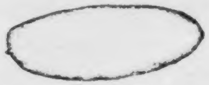
2. Discussion:
   a. Classify our sun - its size, color, magnitude and temperature.
   b. Discuss the life span of a star.

3. The faintest star that can be seen with the naked eye must have a magnitude of (a) 2, (b) 6, (c) 8, (d) 14.

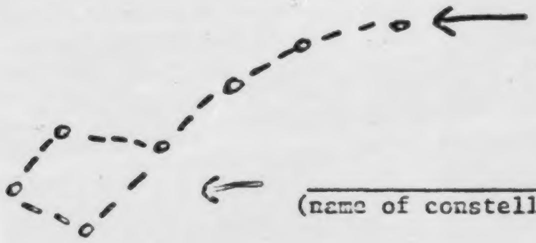
A.4/4.10b 1. Fill in the blanks:



____
(class of galaxy)



____
(class of galaxy)



____
(name of star)

____
(name of constellation)

EARTH SCIENCE

4.00 UNIT: STARS AND STAR GROUPS

4.10 Topic: Classification of Stars and Star Groups

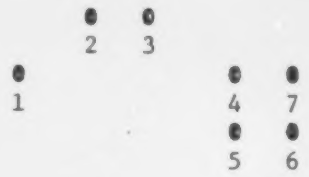
Subtopic/Specifications/Content Number *Test Item*

2. The sun and the earth are in the galaxy known as (a) Andromedra, (b) Little Bear, (c) Scorpion, (d) Milky Way.

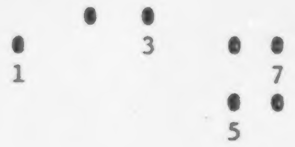
3. Which one is not a kind of galaxy? (a) Elliptical, (b) Spiral, (c) Square, (d) Irregular.

4. The closest galaxy to our own is in (a) Orion, (b) Sirius, (c) Antares, (d) Andromeda.

E.2/4.10c 1. As shown below in the diagram of the Big Dipper, the pointer stars indicating the direction of Polaris are numbered (a) 2 and 1, (b) 4 and 7, (c) 5 and 6, (d) 6 and 7.



2. As shown below in the diagram of the Little Dipper, Polaris is the star numbered (a) 7, (b) 1, (c) 3, (d) 5.



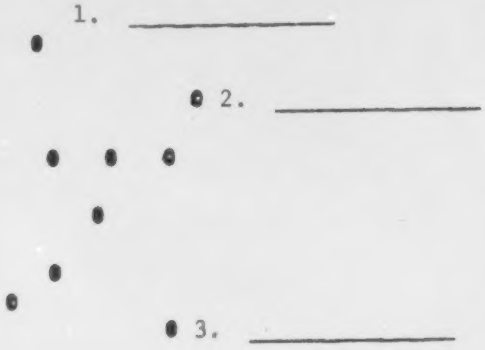
EARTH SCIENCE

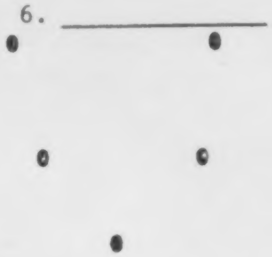
4.00 UNIT: STARS AND STAR GROUPS

4.10 Topic: Classification of Stars and Star Groups

Subtopic/Specifications/Content Number *Test Item*

3. Label the special name stars, the constellations and give the common names. Use the numbered spaces.





7. Constellation name ______________

8. Common name ____________

4. Constellation name ______________

5. Common name ____________________

9. Name the white planet seen in the eastern sky at 6 a.m. ____________________

10. Name the gold planet seen in the south western sky at 6 p.m. ________________

4.00 UNIT: STARS AND STAR GROUPS

4.20 Topic: Measuring Objects in the Universe

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*E.1/4.20a	The student will demonstrate the earth's rotation using a foucault pendulum.		
C.6/4.20b	Using experiments on parallax, students will be able to explain how astronomers are able to measure the distances of near-by stars.		
*D.3/4.20c	Given information on the mass and volume of various objects, the student will demonstrate how mass, volume, and density are related.		

EARTH SCIENCE

4 .00 UNIT: STARS AND STAR GROUPS

4.20 Topic: Measuring Objects in the Universe

Subtopic/Specifications/Content Number	*Test Item*
E.1/4.20a	1. From the reconstruction of Foucault pendulums in class, explain its workings and importance to astronomy and why the stars seem to move from east to west.
	2. Stars seem to move from east to west because (a) the earth revolves around the sun, (b) the earth's axis is tilted away from its plane, (c) the earth rotates on its axis from west to east, (d) none of the above.
C.6/4.20b	No test item submitted.
D.3/4.20c	1. Find the density of a rectangular iron bar which has the dimensions of 6cm x 6cm x 10cm (volume = ___cm^3) and was found to have the mass of 72 grams. D = ________ (Don't forget the units)
	2. A plastic rod weighing 24 grams and having a volume of $18cm^3$ was given to a student to find the density. He was told that any object having a density greater than 1.0 would not float in water. a. Find the density of the rod. b. Will it sink or float in water?
	3. Find the volume or area of a rectangle iron bar which has the dimensions of 6cm x 6cm x 1cm. (V = l x w x t)

5.00 UNIT: THE SOLAR SYSTEM

5.10 Topic: The Sun

Objectives (*Minimum Objectives)	Activities	References
*E.2/5.10a The student will construct a diagram of the sun correctly labeling the layers and the many disturbances of the sun.		
*C.6/5.10b Students will be able to discuss the effects that the disturbances on the sun have on the earth.		
C.6/5.10c The student will explain the nuclear reactions necessary to produce the source of the sun's energy.		

5.00 UNIT: THE SOLAR SYSTEM
5.10 Topic: The Sun

Subtopic/Specifications/Content Number *Test Item*

E.2/5.10a 1. Diagram the sun and label the parts and disturbances listed below:

- a. sunspots
- b. photophere
- c. prominences
- d. chromosphere
- e. solar flares
- f. core
- g. corona

Subordinate Test Items

1. The part of the sun visible only during an eclipse is the (a) corona, (b) chromosphere, (c) photosphere, (d) core.

2. Which of the following is not effected by solar flares? (a) our weather, (b) communications on earth, (c) high altitude winds, (d) ocean tides.

C.6/5.10b 1. True or False? Disturbances on the sun cause interference in our radio and television reception here on earth.

Subordinate Test Items

1. How are sunspots different from the rest of the sun's surface? What causes this?

2. Two types of solar eruptions are (a) flares and sunspots, (b) auroras and solar flare, (c) a corona and solar flare, (d) solar flares and solar prominences.

3. The most violent activities on the sun seem to be connected to (a) auroras, (b) sunspot activity, (c) solar flares, (d) solar prominences.

C.6/5.10c 1. Discussion: Explain how the sun produces energy from nuclear reactions. Discuss the beginning substances in the chain reaction and the end product.

2. Name two thermonuclear reactions that occur in the sun. Discuss them by giving similarities and differences between the reactions.

3. Write the simple equation of fusion of hydrogen atoms.

Subordinate Test Item

1. The sun produces energy by (a) the explosion of oxygen molecules, (b) the conversion of protons into electrons, (c) the conversion of hydrogen into helium, (d) the fission of helium atoms.

5.00 UNIT: THE SOLAR SYSTEM

5.20 Topic: Other Members of the Solar System

Objectives	(*Minimum Objectives)	Activities	References
*A.4/5.20a	The student will identify correctly the members of the Solar System by their characteristics.		
*E.1/5.20b	The student will demonstrate the difference between rotation and revolution in a laboratory investigation.		
D.3/5.20c	The student will explain the greenhouse effect and the influence it has on the planet Venus.		
E.2/5.20d	The student will demonstrate his knowledge ot Kepler's laws of planetary motion, by making a diagram that represents each law.		

EARTH SCIENCE

5.00 UNIT: THE SOLAR SYSTEM

5.20 Topic: Other Members of the Solar System

Subtopic/Specifications/Content Number *Test Item*

A.4/5.20a 1. Listed below are a list of statements about the planets. Match the correct statement to the planet. Some planets may be used more than once. Write letter of planet.

a. Mercury
b. Venus
c. Mars
d. Jupiter
e. Saturn
f. Neptune
g. Uranus
h. Pluto

_____ 1. largest planet
_____ 2. traps a great deal of heat with thick clouds
_____ 3. has rings around it
_____ 4. first to be found through use of mathematics
_____ 5. Earth's morning star
_____ 6. closest planet to the sun
_____ 7. has seasonal polar cap
_____ 8. farthest planet from sun
_____ 9. has large red spot
_____ 10. the "contrary" moving planet

2. The following facts are true of the planet Pluto except:
a. Pluto is the last planet to be discovered
b. Pluto is the farthest planet from the sun
c. Pluto is the 2nd largest planet
d. Pluto was discovered in the 20th century

3. Below are listed 9 planets. Place the number of moons each has by its name.
1. Mercury _____
2. Venus _____
3. Earth _____
4. Mars _____
5. Jupiter _____
6. Saturn _____
7. Uranus _____
8. Neptune _____
9. Pluto _____

Subordinate Test Items

1. Below is a sentence often used to help remember the names of the planets and their respective distances from the sun. The first letter of each word is the first letter of each planet. Write the name of the planet represented by each letter underlined.

My very educated mother just sent us nine pickles.

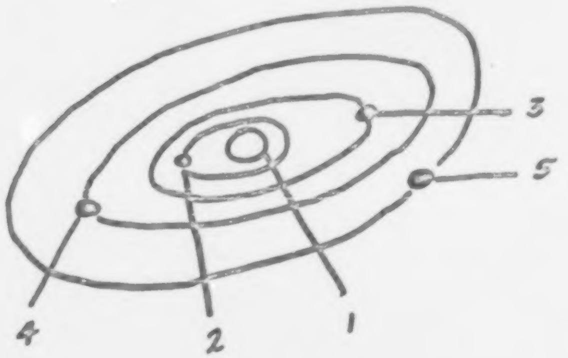
EARTH SCIENCE

5.00 UNIT: THE SOLAR SYSTEM
5.20 Topic: Other Members of the Solar System

Subtopic/Specifications/Content Number *Test Item*

2. Label:
1. ____
2. ____
3. ____
4. ____
5. ____

A. Mars
B. Jupiter
C. Sun
D. Earth
E. Venus
F. Mercury



E.1/5.20b Subordinate Test Items

1. Place the letter of the correct answer in the blank to the left of the number.

____ 1. The name of the path that a planet takes around the sun.
____ 2. The movement of a planet which causes the years and seasons.
____ 3. The name of the imaginary line that Mercury makes as it crosses between the Earth and the sun.
____ 4. The movement of a planet on its axis.
____ 5. The shape of a planet's path around the sun.

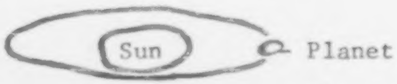
A. Elliptical
B. Titan
C. Transit
D. Orbit
E. Revolution
F. Rotation

2. Show how rotation causes day and night.

D.3/5.20c No test item submitted.

E.2/5.20d Subordinate Test Item

1. This diagram, which shows a planet moving in an elliptical or egg-shaped orbit around the sun, supports the law of (a) Newton, (b) Kepler, (c) Galileo.



5.00 UNIT: THE SOLAR SYSTEM

5.30 Topic: The Moon

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.4/5.30a	The student will identify the following terms: perigee, umbra, full moon, eclipse, neaptide, penumbra, spring tide, apogee, and earthshine.		
*E.2/5.30b	The student will draw correctly and identify the phases of the moon.		
*B.1/5.30c	The student will compute the weights of several objects on the moon when given the weights of these objects on earth.		
E.1/5.30d	The student will place the sun, moon, and earth in their correct positions to achieve a lunar and a solar eclipse.		
*C.6/5.30e	The student will demonstrate an understanding of the relationship between the moon and tides by predicting future tides.		

EARTH SCIENCE

5.00 UNIT: THE SOLAR SYSTEM
5.30 Topic: The Moon

Subtopic/Specifications/Content Number *Test Item*

A.4/5.30a 1. Match the phrase in the left column with the correct phrase or word in the right column.

_____ 1. Lightest part of a shadow
_____ 2. Flat surfaces or plains on the moon.
_____ 3. Darkest part of a shadow.
_____ 4. Changes in the appearance of the moon.
_____ 5. Cuplike depressions on the moon caused by volcanoes or meteors
_____ 6. Light from the earth reflected by the moon.
_____ 7. Point in the moon's orbit farthest from the earth.
_____ 8. Point in the moon's orbit closest to the earth.
_____ 9. The cutting off of light from one heavenly body by another.
_____ 10. The earth's natural satelite.

A. Craters
B. Perigee
C. Phases
D. Umbra
E. Eclipse
F. Apogee
G. Seas of the Moon
H. Penumbra
I. Earthshine
J. The Moon

2. Fill in the blanks with correct phrases or words:

a. The moon's gravitational pull raises two tidal bulges on the earth. The bulge facing the moon is called the _________ ___________. The one on the other side is called the _______ ____________. (They are higher than normal).

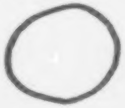
b. High tides produced during full moon and new moon are called _________ ____________.

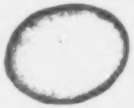
c. High tides produced furing First Quarter and the Last Quarter are called _____________ ______________. (They are lower than normal).

E.2/5.30b 1. Draw and diagram the phases of the moon.

Subordinate Test Items

1. Identify the following phases of the moon as seen from earth.
Word list: Full moon, new moon, quarter moon, crescent, Gibbous moon.


A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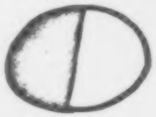
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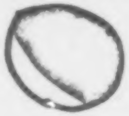
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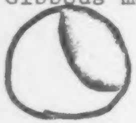

E

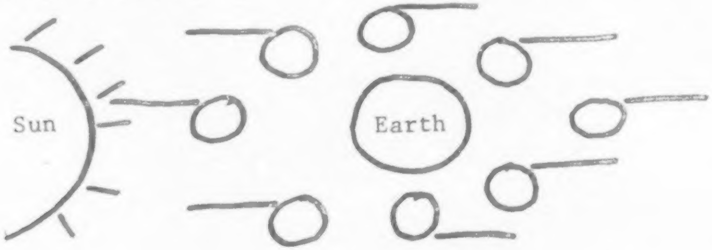
EARTH SCIENCE

5.00 UNIT: THE SOLAR SYSTEM

5.30 Topic: The Moon

Subtopic/Specifications/Content Number *Test Item*

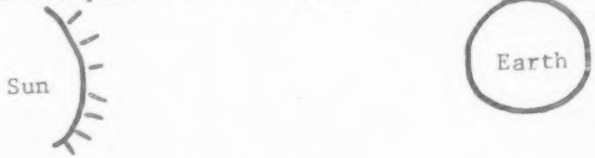
2. On the diagram below, write the name of the phase of the moon that would be seen from earth. Shade in that portion that would not be seen.



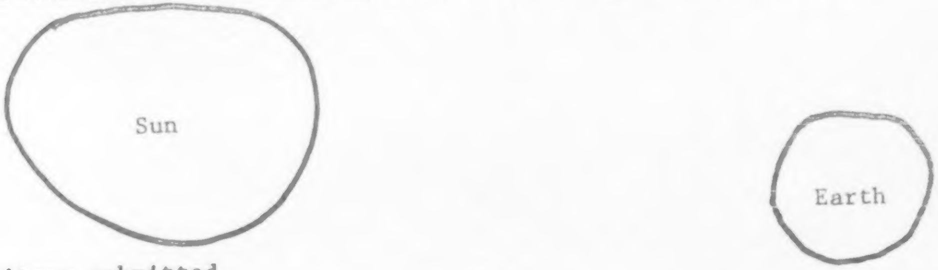
B.1/5.30c 1. True or False. Correct the statement if it is false. An astronaut who weighs 144 pounds on earth would weigh only 24 pounds on the moon.

2. An object that weighs 96 pounds on earth will weigh (6 lbs., 12 lbs., 16 lbs., 32 lbs.) on the moon.

E.1/5.30d 1. In the partially completed diagram below, place the moon in the correct place to produce a total solar eclipse. Put in all parts of shadow. Show with arrows where the eclipse would occur.



2. Place the moon in the correct place to produce a lunar eclipse.



C.6/5.30e No test items submitted.

5.00 UNIT: THE SOLAR SYSTEM

5.40 Topic: The Origin of the Solar System

Objectives (*Minimum Objectives)	Activities	References
D.3/5.40a The student will explain the ideas behind the theories of the origin of the solar system such as: (a) Planetesimal Theory, (b) Companion Star Theory, and (c) Cloud of Dust Theory.		

5.00 UNIT: THE SOLAR SYSTEM
5.40 Topic: The Origin of the Solar System

Subtopic/Specifications/Content Number	Test Item
D.3/5.40a	1. Collision or near miss between the sun and another star is the basis of the (Planetesimal) Theory.
	2. The (Cloud of Dust) Theory assumes that a vast saucer shaped hot cloud of gas and dust cooled and shrank forming a series of rings around the sun which later became planets.
	3. The theory which assumes that the sun once had a companion star is the (Companion Star) Theory.
	4. One of the most accepted theories of the origin of the solar system is (a) Big Bang Theory, (b) Planetesimal Theory, (c) Steady State Theory, (d) Cloud of Dust Theory.

5.00 UNIT: THE SOLAR SYSTEM
5.50 Topic: Astronomy - Time

Objectives	(*Minimum Objectives)	Activities	References
*E.1/5.50a	The student will show the rotation of the earth and how this rotation causes day and night.		
*E.1/5.50b	The student will show how the revolution of the earth around the sun causes a change of seasons and the varying amounts of lightness and darkness on the earth as the seasons change.		

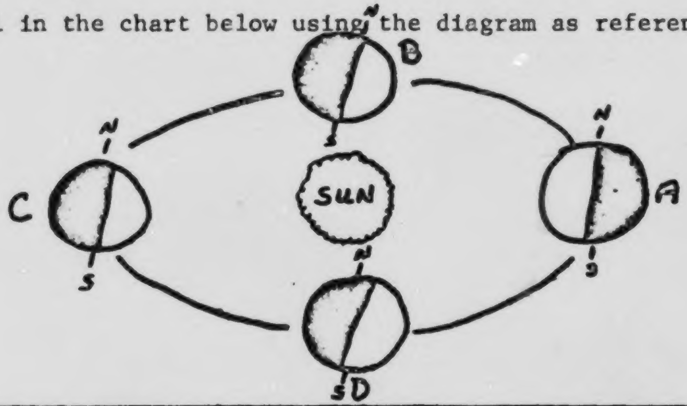
5.00 UNIT: THE SOLAR SYSTEM
5.50 Topic: Astronomy - Time

Subtopic/Specifications/Content Number	*Test Item*

E.1/5.50a Subordinate Test Item

1. A demonstration in which a spinning globe is illuminated from one direction creating light and shadow zones is related to (a) night and day, (b) summer and winter, (c) spring and fall, (d) total eclipse.

E.1/5.50b 1. Fill in the chart below using the diagram as reference.



Position of Earth	Season in N. H.	Date Season Begins	Sun Overhead
A	Winter	Dec. 21	T. of Capricorn
B	Spring	March 21	Equator
C	Summer	June 21	T. of Cancer
D	Fall	Sept. 21	Equator

6.00 UNIT: MATERIALS OF THE EARTH'S SURFACE

6.10 Topic: Properties of the Lithosphere

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.3/6.10a	The student will demonstrate his comprehension of a periodic chart of the elements by listing examples of elements that are liquids, solids, gases, and man-made elements.		
*A.2/6.10b	The student will write symbols for at least twenty elements correctly.		

6.00 UNIT: MATERIALS OF THE EARTH'S SURFACE
6.10 Topic: Properties of the Lithosphere

Subtopic/Specifications/Content Number	*Test Item*

A.3/6.10a 1. From the periodic chart, list five solids, two liquids, five gases and five man-made elements.
*There are other possible answers.

Solids	Liquids	Gases	Man-made
Iron	Mercury	Oxygen	Neptunium
Sodium	Bromine	Hydrogen	Plutonium
Zinc		Nitrogen	Californium
Gold		Argon	Einsteinium
Silver		Neon	Lawrencium

2. From the following groups of elements, select the group that are man-made.
   a. Californium, Einsteinium, Fermium, Curium
   b. Oxygen, Hydrogen, Helium, Argon
   c. Carbon, Calcium, Iron, Tin
   d. Aluminum, Neon, Lead, Chronium

3. Teacher will provide a list of elements. Complete the chart below.
   a. Give the symbol for each element.
   b. Indicate whether the element is a solid, liquid, or gas by placing a ✓ under the proper heading.
   c. Indicate whether the element is a metal or nonmetal by placing a ✓ under the proper heading.

A.2/6.10b Below are given 20 elements. Write symbols for at least 15.

_____ 1. Hydrogen
_____ 2. Helium
_____ 3. Iron
_____ 4. Calcium
_____ 5. Potassium
_____ 6. Carbon
_____ 7. Sodium
_____ 8. Chlorine
_____ 9. Nitrogen
_____ 10. Neon
_____ 11. Oxygen
_____ 12. Magnesium
_____ 13. Lead
_____ 14. Aluminum
_____ 15. Silver
_____ 16. Gold
_____ 17. Mercury
_____ 18. Radium
_____ 19. Uranium
_____ 20. Copper

6.00 UNIT: MATERIALS OF THE EARTH'S SURFACE

6.20 Topic: The Structure of Matter

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
D.3/6.20a	The student will distinguish between the properties of matter (weight, mass, volume, density, organic and inorganic).		
*E.2/6.20b	Given the number of protons, neutrons, and electrons, the student will display a knowledge of atomic structure by diagramming atoms of specific elements.		
*B.2/6.20c	The student will find the atomic number, atomic weight, give the number of electrons, and the symbol for the element in problems where the variable asked for is not given.		
*A.3/6.20d	Given a list of formulas, the student will demonstrate his comprehension of chemical compounds by classifying the type of compound it is (acid, salt, base, oxide).		
A.4/6.20e	The student will describe how atoms of elements combine in various ways to form rocks and minerals and why certain elements will react and others will not.		

6.00 UNIT: MATERIALS OF THE EARTH'S SURFACE

6.20 Topic: The Structure of Matter

Subtopic/Specifications/Content Number	Test Item

D.3/6.20a Subordinate Test Items

1. Identify the physical properties and chemical properties of matter.
   - a. paper
   - b. match
   - c. rusting of iron
   - d. wood
   - e. souring of milk

2. In the chart below are listed 5 substances. For each substance write 2 outstanding physical properties, 2 chemical properties and the state of matter as determined in the lab investigation.

Substance	Physical Property	Chemical Property	State
Sulfur			
Iron Filings			
Marble chips			
Oxygen			
Alcohol			

E.2/6.20b Subordinate Test Items

1. Diagram an atom with an atomic number of 2 and an atomic weight of 4.

2. Using your knowledge of atomic number and atomic weight, determine the number of protons, neutrons and electrons; then diagram atoms of :

a. Carbon	b. Aluminum	c. Oxygen
At. No. 6	At. No. 13	At. No. 8
At. Wt. 12	At. Wt. 27	At. Wt. 16

B.2/6.20c 1. Complete the chart:

Symbol	Element	At. No.	At. Wt.	Protons	Electrons	Neutrons
H	Hydrogen	1	1	1	1	
He	Helium	2		2	2	2
	Oxygen	8	16	8	8	8
Al	Aluminum		27	13	13	14

6.00 UNIT: MATERIALS OF THE EARTH'S SURFACE
6.20 Topic: The Structure of Matter

Subtopic/Specifications/Content Number *Test Item*

2. From the elements given, tell how many electrons, protons, and neutrons are found in each atom.

$_{8}\text{O}^{16}$

+ ____
- ____
N ____

$_{26}\text{Fe}^{56}$

+ ____
- ____
N ____

3. To find the atomic number of an atom, we add (a) the number of protons, (b) the number of neutrons, (c) the number of electrons.

4. The element which has the symbol K has 19 protons, an atomic weight of 39.1. The number of neutrons is (a) 19, (b) 20, (c) 39, (d) 58.

A.3/6.20d 1. Place the following compounds in the proper column below:

	Acid	Salt	Base	Oxide
H_2O				H_2O
H_2SO_4	H_2SO_4			
$Ca(OH)_2$			$Ca(OH)_2$	
NaCl		NaCl		
HCl	HCl			
KOH			KOH	
CO_2				CO_2

2. For the following compounds indicate the color change when tested with blue and red litmus paper and phenolphthalein:

sodium hydroxide	turns red litmus blue
hydrochloric acid	turns blue litmus red
sodium chloride	no effect on litmus
sodium hydroxide	turns red with phenolphthalein
hydrochloric acid	remains the same with phenolphthalein

3. The formula H_2CO_3 represents a compound that is classified as (a) an acid, (b) a base, (c) a salt, (d) an oxide.

6.00 UNIT: MATERIALS OF THE EARTH'S SURFACE
6.20 Topic: The Structure of Matter

Subtopic/Specifications/Content Number — *Test Item*

A.4/6.20e 1. Using your periodic charts, show by diagramming the atoms Magnesium and oxygen why they will react readily. Use arrow to show any transfer or sharing of particles.

Subordinate Test Items

1. What type of reaction is $AX + BY \rightarrow AY + BX$, double replacement, synthesis, decomposition.

2. Identify the following chemical reactions:
   - a. $CaO + H_2O \rightarrow Ca(OH)_2$
   - b. $MgCl_2 \rightarrow Mg + Cl_2$
   - c. $Fe + H_2SO_4 \rightarrow H_2 + FeSO_4$
   - d. $NaCl + AgNO_3 \rightarrow NaNO_3 + AgCl$

   1. Synthesis
   2. Decomposition
   3. Single Replacement or Substitution
   4. Double Replacement

3. Decide which of the following are actual compounds. Support your decision.

____ 1. K_2O ________________________________
____ 2. Al_2O_3 ________________________________
____ 3. $AlCl_3$ ________________________________
____ 4. Al_2Cl_3 ________________________________
____ 5. NeO ________________________________

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS

7.10 Topic: Identifying Minerals by Physical Properties

Objectives *(*Minimum Objectives)*	*Activities*	*References*
*A.1/7.10a The student will identify the following terms: mineral, rock, fracture, cleavage, streak, hardness, texture, luster, crystal form.		

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS

7.10 Topic: Identifying Minerals by Physical Properties

Subtopic/Specifications/Content Number *Test Item*

A.1/7.10a 1. Matching:

_____ 1. The irregular breaking of a mineral
_____ 2. Single inorganic elements or compounds found naturally in the earth's crust.
_____ 3. Atoms, ions, or molecules arranged in a definite pattern
_____ 4. The splitting of a mineral along a plane
_____ 5. The color of a fine powder of a mineral

A. Scratch
B. Crystal
C. Streak
D. Fracture
E. Minerals
F. Rocks
G. Cleavage

2. Match the following:

_____ 1. Chemical compounds or uncombined elements found in rocks
_____ 2. Closely bound masses of minerals
_____ 3. The way a mineral breaks
_____ 4. Breaking of a mineral so that it yields flat surfaces
_____ 5. Powder of a mineral
_____ 6. Resistance to being scratched
_____ 7. Size of grains
_____ 8. Appearance of mineral in reflected light
_____ 9. Geometric shape

A. Fracture
B. Streak
C. Texture
D. Mineral
E. Luster
F. Hardness
G. Cleavage
H. Crystal form
I. Rock

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS

7.20 Topic: Special Tests Used for Mineral Identification

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*E.1/7.20a	The student will perform certain tests to show the physical properties of at least five different minerals.		
*A.3/7.20b	The student will demonstrate his understanding of Moh's scale of hardness by classifying mineral specimen from softest to hardest.		
*A.2/7.20c	The student will list the special properties of minerals and tell how these properties are of value to man.		

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS
7.20 Topic: Special Tests Used for Mineral Identification

Subtopic/Specifications/Content Number *Test Item*

E.1/7.20a Subordinate Test Items

1. If you were given 3 minerals similar in color - halite, calcite and quartz, what two tests could be used to determine their idenity? ____________ ____________ Explain how you would use them.

2. A mineral when tested produced a dark streak.
   a. Is this mineral a metal or non-metal?
   b. What color streak would feldspar produce?

3. How is mineral hardness tested? (Check one)
   _____ a. By rubbing the mineral across unglazed tile.
   _____ b. By placing a drop of acid on the mineral.
   _____ c. By scratching the sample.

A.3/7.20b 1. According to our scale, if we can scratch a mineral with our fingernail what is its hardness? (a) 0, (b) 1, (c) 2, (d) 3.

2. List the following minerals in order according to hardness (from softest to hardest).

(5) opatite
(1) talc
(7) quarte
(10) diamond
(6) feldspar
(2) gypsum
(4) fluorite
(8) topaz
(3) calcite
(9) corundum

A.2/7.20c 1. Write a paper of not less than 150 words listing special properties of minerals and tell how these minerals are of value to man.

Subordinate Test Items

1. This kind of mineral will glow in ultraviolet light. (a) effervesce, (b) phosphorescent, (c) flourescent.

2. To test for radioactivity we use (a) magnet, (b) geiger counter, (c) ultraviolet lamp.

3. This mineral will glow even after the ultraviolet lamp has been removed. (a) effervesce, (b) phosphorescent, (c) flourescent.

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS

7.30 Topic: Non-Metallic Minerals

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
A.4/7.30a	The student will identify several non-metallic minerals by their chemical composition and special properties.		
*E.2/7.30b	The student will diagram or assemble the six crystal systems and give an example of each.		

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS
7.30 Topic: Non-Metallic Minerals

Subtopic/Specifications/Content Number *Test Item*

A.4/7.30a 1. What is a non-metallic mineral?

2. Give the chemical composition and properties of the minerals listed below:

Mineral	Chemical Composition	Properties
Calcite ($AcCO_3$)		
Quartz (SiO_2)		
Feldspar ($KAISi_3O_8$)		
Olivine $(MgFe)_2SiO_4$)		

3. The mineral halite can be identified by (a) touch, (b) color, (c) taste.

E.2/7.30b 1. Draw six crystals that you have observed in the various samples of rock.

2. The number of crystal structures there are:
(a) 1, (b) 2, (c) 6, (d) 8.

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS

7.40 Topic: Metallic Minerals

Objectives *(*Minimum Objectives)*		*Activities*	*References*
A.2/7.40a	The student will define metallic minerals and list the chemical composition and properties of at least four.		
A.3/7.40b	The student will select 10 metallic minerals from a list of metallic and non-metallic minerals and tell how each is of value to man.		

7.00 UNIT: PHYSICAL AND CHEMICAL NATURE OF MINERALS
7.40 Topic: Metallic Minerals

Subtopic/Specifications/Content Number *Test Item*

A.2/7.40a 1. Which of the following minerals might be an ore of iron? (a) PbS, (b) ZnS, (c) Al_2O_3, (d) Fe_2O_3.

2. If you knew the streak color of a mineral were black what would be its luster? (a) vitra, (b) earthy, (c) metallic, (d) non-metallic.

3. Metallic minerals have a light streak. True or False?

4. What is a metallic mineral?

5. Give the chemical composition and properties of the minerals listed below:

Mineral	Chemical Composition	Properties
Hemalite (Fe_2O_3)		
Cinnabar (HgS)		
Pyrite (FeS_2)		
Uranimite (UO_2)		

A.3/7.40b 1. Place the minerals below in the proper column in the chart:

Mineral	Metallic	Non-Metallic
Cuprite	*	
dolomite		*
uranimite	*	
gold	*	
apatite		*
bauxite	*	
malachite	*	
limonite	*	
calcite		*
sulfur		*
silver	*	
azurite	*	
hematite	*	
fluorite		*
cinnabar	*	

8.00 UNIT: ROCKS AND THE ROCK CYCLE

8.10 Topic: Rock Classification

Objectives (**Minimum Objectives)*	*Activities*	*References*
*B.1/8.10a The student will demonstrate his ability to use terms pertaining to rocks correctly.		
*A.3/8.10b Given rock samples, the student will classify the rocks as igneous, sedimentary, or metamorphic.		
*D.3/8.10c The student will devise several simple experiments to help him identify a group of rocks.		

EARTH SCIENCE

8.00 UNIT: ROCKS AND THE ROCK CYCLE
8.10 Topic: Rock Classification

Subtopic/Specifications/Content Number *Test Item*

B.1/8.10a 1. Using the words given in your assignment sheet (Act. 1) group in as many groups as possible - each having something in common or related to each other in some way. You may use the words in more than one group. Be able to defend your grouping.

2. Complete the exercise using the definitions below:

Words	Definitions
1. Basic	_____ 1. Rocks formed beneath the earth's surface
2. Igneous	_____ 2. Molten material that reaches the earth's surface
3. Lava	_____ 3. Rocks formed from cooling and solidification of hot molten lava
4. Intrusive	_____ 4. Darker igneous rocks

A.3/8.10b 1. Tell what type of rock each of the following is - use "S" for sedimentary, "I" for igneous, and "M" for metamorphic.

_____ 1. slate
_____ 2. pumice
_____ 3. conglomerate
_____ 4. basalt
_____ 5. mica schist
_____ 6. limestone

2. Classify these rocks as being Sedimentary, Igneous, or Metamorphic:

limestone ___________
sandstone ___________
granite ___________
obsidian ___________
shale ___________
slate ___________

3. Go to all "15 stations" around the room and classify the rock specimens "igneous", "sedimentary", or "metamorphic" and give the name of each rock.

D.3/8.10c No test item submitted.

8.00 UNIT: ROCKS AND THE ROCK CYCLE
8.20 Topic: Igneous Rock

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*B.2/8.20a	The student will tell the following about samples of igneous rock: if it is acidic or basic, if it is formed from magma or lava, if it is intrusive or extrusive rock.		
E.1/8.20b	The student will demonstrate his knowledge as to how crystals are formed through an investigation emphasizing the rate of cooling and crystal size.		
A.4/8.20c	Students will identify and give uses of the eight common igneous rocks.		

8.00 UNIT: ROCKS AND THE ROCK CYCLE
8.20 Topic: Igneous Rock

Subtopic/Specifications/Content Number *Test Item*

B.2/8.20a Subordinate Test Items

1. A simple field method of identifying igneous rocks is to classify them according to whether they are (light) or (dark) colored. If the rock is light-colored (white, gray, pink, red) it is composed largely of the silica-aluminum (acidic) group of minerals. The rock also will be relatively (light) in weight. If the rock is dark-colored (black, dark gray, dark green) it is composed largely of the iron magnesium-calcium (basic) group of minerals.

2. Explain the difference between the formation of intrusive igneous rock and extrusive igneous rock.

3. How is extrusive volcanism different from intrusive volcanism. Describe and name a feature that may result from each type of volcanism.

E.1/8.20b Subordinate Test Items

1. The rate of crystal formation (a) increases, (b) decreases, (c) remains the same, with an increase in temperature. Large crystals are formed as a result of (slow) cooling.

2. Classify the following igneous rocks according to texture: Scoria, Basalt, Granite, Diorite, Pumice, Obsidian, Pegmatite, Rhyolite. Give the conditions that cause them to vary in texture.

Coarse-Grained	Fine-Grained	Glassy

3. Examine rock specimen #1 (Pegmatite), #2 (Granite), #3 (Porphyry). Explain the process each went through in order to become what it is now.

A.4/8.20c No test item submitted.

8.00 UNIT: ROCKS AND THE ROCK CYCLE

8.30 Topic: Sedimentary Rock

Objectives (*Minimum Objectives)	Activities	References
*A.4/8.30a The student will tell how sedimentary rock is formed, give the cementing agents used and list the names of some sedimentary rocks.		
*D.3/8.30b The student will explain the relationship between weathering, erosion, and the forces of nature in the formation of sedimentary rock.		
*E.1/8.30c Through the use of laboratory investigations, the student will demonstrate his knowledge of how sedimentary rock is formed.		

EARTH SCIENCE

8.00 UNIT: ROCKS AND THE ROCK CYCLE
8.30 Topic: Sedimentary Rock

Subtopic/Specifications/Content Number — *Test Item*

A.4/8.30a 1. Which one of the following operations from the rock cycle would change sediments into sedimentary rock? (a) solidification, (b) cementation and compaction, (c) weathering and erosion.

2. What are the three operations that change sedimentary rock and what are the results of these changes?

Subordinate Test Item

1. What are sedimentary rocks made of? (a) fossils, (b) pieces of rock, (c) products of chemical action, (d) all of these.

D.3/8.30b 1. How does weathering and erosion contribute to the formation of sedimentary rocks?

2. Name 2 sedimentary rocks formed by the fragmental and chemical processes.

3. Define Weathering - (The breaking down of solid rock into smaller pieces.)

4. Define Erosion - (The removal of soil and rock fragments by natural agents).

5. How do the above terms contribute to the formation of sedimentary rocks? (As the soil particles are removed and carried away, they may settle in specific areas and form sedimentary rocks.)

Subordinate Test Items

1. Weathered and eroded igneous rocks supply the material for the formation of ________________ rocks.

2. From the map given on the Record of the Rocks, answer the following questions:
   a. Which layer of rock is the oldest? (A, B, C, or D)
   b. Why are the layers marked A, B, C, and D steeper than the ones between them?
   c. If a fossil is found at E and another at G, what inference can you make?
   d. If a fossil specie is found at E, B, G, and H but not in rocks above or below, what reference can you make.

   (Teacher will provide map to dover necessary situations).

8.00 UNIT: ROCKS AND THE ROCK CYCLE

8.30 Topic: Sedimentary Rock

Subtopic/Specifications/Content Number	*Test Item*

E.1/8.30c 1. Students will get necessary materials and conduct a lab investigation of how sedimentary rocks can be formed. Investigation will serve as visual exploration of reading material. (Teacher will provide Lab worksheet.)

2. Examine and test each of the rocks to determine its composition, with and its origin or method of formation. Enter your observations in the table below.

Rock	Composition	Acid Reaction	Origin 1, 2
Shale	(Mud, Clay, salt)	(Yes)	(1)
Red Sandstone	(Quartz)	(No)	(1)
Conglomerate	(Gravel)	(No)	(1)
Rock Salt	(Residue from ocean lake)	(No)	(2)

Subordinate Test Item

1. Students will turn in their notebooks to Drawing of "Rock Structure Beneath the Ground". Explain in writing how the rock cycle could be interpreted through this picture.

8.00 UNIT: ROCKS AND THE ROCK CYCLE

8.40 Topic: Metamorphic Rock

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
A.2/8.40a	The student will tell the origin of at least five metamorphic rocks.		
*A.2/8.40b	The student will list the ways metamorphic rocks are of value to man.		
E.2/8.40c	The student will demonstrate his knowledge of the rock cycle by diagramming the cycle and explaining how these changes can occur in rock.		

EARTH SCIENCE

8.00 UNIT: ROCKS AND THE ROCK CYCLE
8.40 Topic: Metamorphic Rock

Subtopic/Specifications/Content Number *Test Item*

A.2/8.40a 1. Match the metamorphic rock with the sedimentary or igneous rock from which it was formed. You must do at least 5.

_____ 1. slate
_____ 2. marble
_____ 3. gneiss
_____ 4. quartzite
_____ 5. graphite
_____ 6. schist
_____ 7. phyllite
_____ 8. serpentime
_____ 9. anthracite
_____ 10. Quartzite conglomerate

A. shale
B. limestone
C. sandstone
D. conglomerate
E. bituminous
F. anthracite coal
G. Peridotite

2. Examine each of the rocks to determine composition, its origin, and its identifying characteristics. Enter your observations in the table below.

Rock	Composition	Origin	Identifying Characteristics
Slate		(Shale)	
Marble		(Limestone)	
Quartzite		(Sandstone)	
Mica		(Igneous Rock)	
Gneiss		("/ Schist)	

A.2/8.40b 1. Underline all words that are directly related to metamorphic rock.
foliated, deposition, Quartzite, monuments, heat, change, blackboards, Gneiss, pressure, magma, breccia.

Subordinate Test Item

1. Match the following metamorphic rocks with their use.

_____ 1. Slate
_____ 2. Anthracite coal
_____ 3. Marble
_____ 4. Schist (Mica)

A. Building materials
B. Roofing
C. Insulation
D. Fuel

EARTH SCIENCE

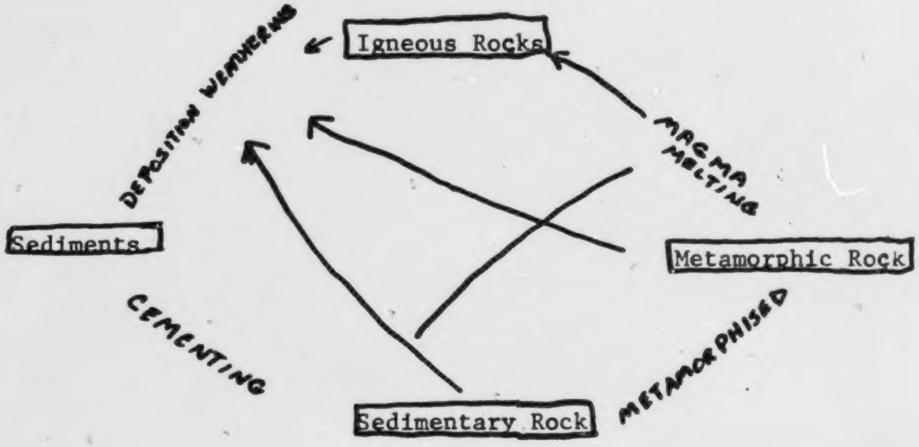
8.00 UNIT: ROCKS AND THE ROCK CYCLE
8.40 Topic: Metamorphic Rock

Subtopic/Specifications/Content Number	*Test Item*
E.2/8.40c	1. Diagram the rock cycle and explain these changes below.

Subordinate Test Item

1. Complete the rock cycle below using the words on the left.

1. Sedimentary rocks
2. Sediments
3. Metamorphosed Rock



9.00 UNIT: MAPS AND MAP READING
9.10 Navigation

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*B.2/9.10a	The student will locate lines of longitude and latitude, prime meredian, and the equator on a map of the world.		
*E.1/9.10b	The student will demonstrate his knowledge of the use of navigational instruments in relationship to maps and map readings.		

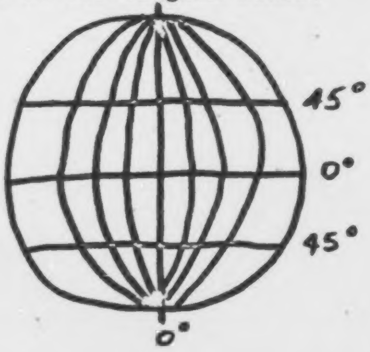
EARTH SCIENCE

9.00 UNIT: MAPS AND MAP READING
9.10 Topic: Navigation

Subtopic/Specifications/Content Number — *Test Item*

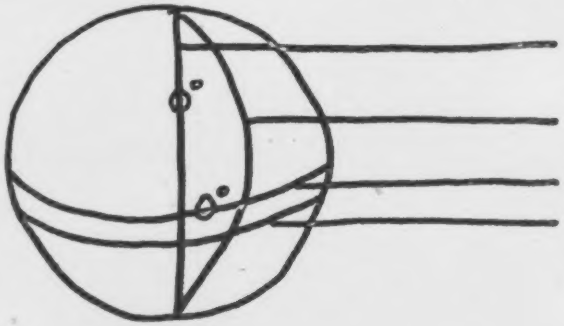
B.2/9.10a 1. Locate the following terms on the diagram below:

a. longitude
b. latitude
c. prime meredian
d. equator



2. Label the diagram below, using the words listed:

equator
north pole
prime meredian
line of latitude (parallel)
line of longitude (meredian)



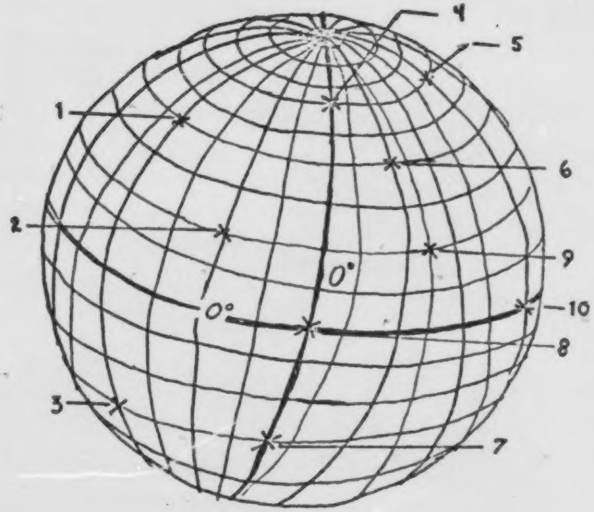
EARTH SCIENCE

9.00 UNIT: MAPS AND MAP READING
 9.10 Topic: Navigation

Subtopic/Specifications/Content Number *Test Item*

3. State the position of the places indicated on the globe by giving their latitude and longitude readings. Example: 30° N. Lat., 15° E. Long.

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________



E.1/9.10b Subordinate Test Items

1. Describe the following navigational instruments.
   a. Magnetic compass
   b. Gyrocompass
   c. Sextant
   d. Photometer

2. A sextant is an instrument used to (a) tell time, (b) measure direction, (c) locate a star's position, (d) measure distance.

9.00 UNIT: MAPS AND MAP READING

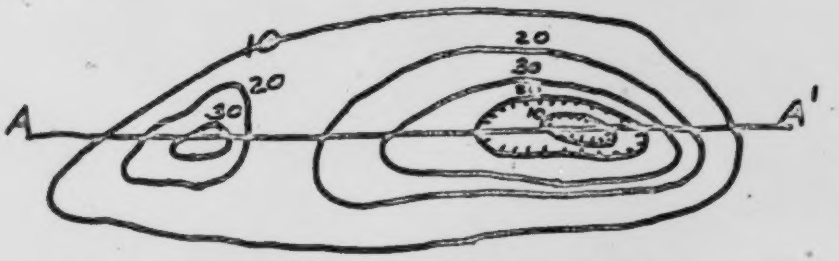
9.20 **Topic:** Maps Used by Earth Scientist

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*E.2/9.20a	The student will demonstrate his ability to use the fundamental skills in reading topographic maps by constructing map profiles and charting specific data.		
*B.1/9.20b	The student will demonstrate his knowledge of topographic and geologic maps by solving practical problems of map reading.		

9.00 UNIT: MAPS AND MAP READING
9.20 Topic: Maps Used by Earth Scientist

Subtopic/Specifications/Content Number *Test Item*

E.2/9.20a 1. Construct a map profile along line A - A^1



2. Using a contour interval of 20' and scale of one inch to one mile, draw a contour map of an island that (a) is 5 miles from east to west and 4 miles from north to south; (b) has a maximum elevation of 119'; (c) is steepest on the east side; (d) has a stream flowing into the ocean on the west shore, with its source at an elevation of 119'.

B.1/9.20b 1. From the topographic map of the Lynchburg area, identify (a) the highest and lowest elevations, (b) the direction of water flow in the James River, (c) the distance from Lynchburg to Oxford Furnace along route 460. (The teacher will provide the map)

Subordinate Test Item

1. Contour lines on a relief map are used to show (a) time zones, (b) frontal systems, (c) hills and valleys, (d) boundaries.

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH

10.10 Topic: Interior of the Earth

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.4/10.10a	The student will describe the physical structure (major layers and characteristics) of the earth.		
A.4/10.10b	The student will demonstrate his ability to describe the Moho, discuss the possible source of the earth's internal heat and describe how earthquake waves are used to study the earth's interior.		
*E.1/10.10c	The student will demonstrate the earth's magnetic field by spreading iron filings on paper over a strong magnet and diagramming results.		

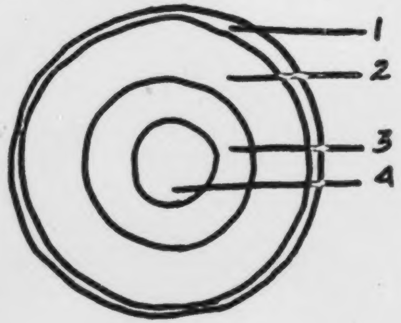
10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.10 Topic: Interior of the Earth

Subtopic/Specifications/Content Number *Test Item*

A.4/10.10a Subordinate Test Items

1. Label the following diagram by filling the blank with the correct word:

1. ____________
2. ____________
3. ____________
4. ____________



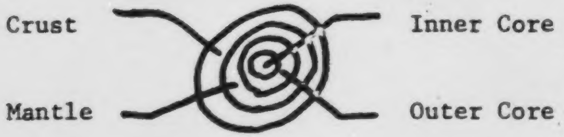
2. Matching:

_____ 1. The thickest part of the crust
_____ 2. The layer of the earth that is made of molten iron and nickel
_____ 3. The very inside layer of the earth
_____ 4. The thinnest layer of the earth
_____ 5. Weight in relation to volume

A. Continent
B. Crust
C. Density
D. Inner Core
E. Mantle
F. Outer Core
G. Size

3. Name the four major layers that make up the earth.

4. Draw and label the 4 major layers of the earth's interior.



EARTH SCIENCE

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.10 Topic: Interior of the Earth

Subtopic/Specifications/Content Number	*Test Item*
A.4/10.10b	1. True or False _____ 1. In the shadow zone you do not feel the earthquake waves. _____ 2. The deepest mine is in the United States. _____ 3. Carbon-14 dating is an example of radioactive dating. _____ 4. The earth is estimated to be 4½ billion years old. _____ 5. The earth is cool on the inside but hot on the outside.
	2. The main source of heat for the crust is thought to be (a) radioactivity, (b) heat moving out from the core, (c) the sun, (d) friction between the mantle and core.
	3. The upper layers of the earth receive little heat from the interior because (a) rock conducts heat slowly, (b) the mantle is cold, (c) heat flows downward from the warm crust, (d) the metallic core will not give up its heat.
E.1/10.10c	1. Using a bar magnet, one sheet of paper, and iron filings, demonstrate the earth's magnetic field. Are more filings located near the middle or at the ends of the magnet?

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH

10.20 Topic: Size and Shape of the Earth

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
E.1/10.20a	The student will give evidence that the earth is a sphere in a laboratory investigation and explaining the principle used.		
E.2/10.20b	The student will construct angles needed in measurements relative to the earth.		
C.4/10.20c	Given a block of wood, the student will demonstrate his ability to measure accurately the density of the block of wood.		

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.20 Topic: Size and Shape of the Earth

Subtopic/Specifications/Content Number — *Test Item*

E.1/10.20a No test items submitted.

E.2/10.20b No test items submitted.

C.4/10.20c Subordinate Test Items

1. The weight per unit volume of a material is known as an object's (a) volume, (b) diameter, (c) density, (d) inertia.
2. When we speak of the volume of an object, we are speaking of (a) weight, height, and length, (b) the length x height x width, (c) the weight divided by the area, (d) the weight per unit area.
3. If you had two materials that weighed 1,000 grams each, but the volume of A was 2,000 cubic centimeters, and B's volume was 500 cubic centimeters, which would have the greater density? A or B

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH

10.30 Topic: Diastrophism

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.1/10.30a	The student will define the following terms: diastrophism, fault, subsidence, uplift, physiography, geosyncline on a written quiz.		
*A.3/10.30b	The student will classify earth change agents as either natural or man-made.		
E.2/10.30c	The student will diagram the land forms that result from crustal movement.		
*A.3/10.30d	The student will match the causes of earthquakes to examples of earthquakes that were caused in each of these ways.		
B.3/10.30e	The student will interpret the seismography indicators of a quake and predict the physical damage that could be caused in an area hit by the quake.		

EARTH SCIENCE

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.30 Topic: Diastrophism

Subtopic/Specifications/Content Number *Test Item*

A.1/10.30a 1. Place the letter of the correct answer in the blank to the left of the number.

_____ 1. Displaced
_____ 2. Horizontal movement of the earth's crust
_____ 3. Sinking of the earth's crust
_____ 4. A cliff formed at the surface of a fault
_____ 5. The rising of the earth's crust

A. Faulting
B. Fault Scarp
C. Offset
D. Subsidence
E. Thrust
F. Uplift

2. A section of the earth's crust which had been warped downward over a long period of time is called (a) geosyncline, (b) uplift, (c) diastrophism, (d) fault, (e) physiography.

Subordinate Test Items

1. When isostasy operates we believe certain parts of the earth undergo processes and responds in certain ways:

_____ mountain
_____ mountain
_____ sea bottom nearby
_____ sea bottom nearby

A. deposition
B. diastrophism
C. erosion
D. isostasy
E. rise
F. sink

2. We have three directions of motion, up down, sideways. When applied to general motions of parts of the earth's crust we have:

_____ up
_____ down
_____ sideways

A. diastrophism
B. erosion
C. subsidence
D. thrust
E. uplift
F. volcanism

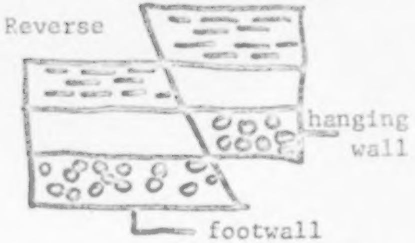
10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.30 Topic: Diastrophism

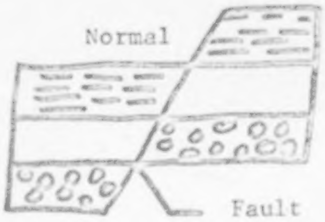
Subtopic/Specifications/Content Number	*Test Item*
A.3/10.30b	Complete the chart below giving the agent responsible for change and tell whether the agent is man-made or natural for each of the ten earth changes listed below. (The teacher will provide a list of earth changes.)
E.2/10.30c	In the space below make a diagram of the model you constructed to show how beds of sedimentary rocks become folded. Label the synclines and anticlines.

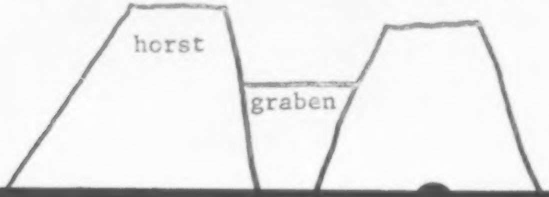
Subordinate Test Item

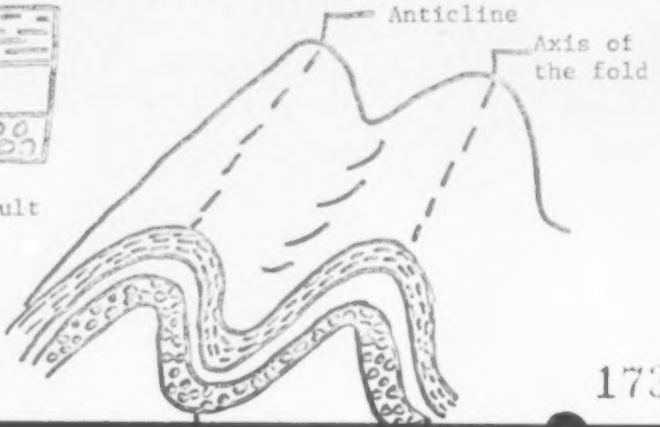
1. Label all of the listed items:

1. Hanging wall
2. Foot Wall
3. Reverse Fault
4. Horst
5. Normal Fault
6. Graben
7. Anticline
8. Syncline
9. Fault
10. Axis of the Fold









10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.30 Topic: Diastrophism

Subtopic/Specifications/Content Number *Test Item*

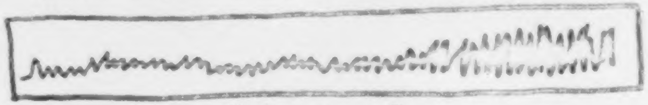
A.3/10.30d Subordinate Test Items

1. Which of the following is a possible cause of earthquakes? (a) heat inside the earth, (b) pressure inside the earth, (c) a gracture in the earth's crust, (d) all of the above.

2. True or False
   a. Earthquakes have been recorded as the result of underground nuclear testing.
   b. Geologists consider earthquakes a destructive natural process.
   c. A seaquake that starts off the shores of Alaska can effect the Hawaaian Islands.
   d. The earth is in a constant state of change, both from internal and external forces.

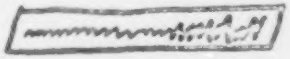
3. What is the name of an earthquake caused by movement of the earth's crust? (a) volcanic earthquake, (b) tsunamis, (c) tactonic earthquake, (d) volcano.

B.3/10.30e 1. Study the seismogram below.
   a. What do the markings on this tape represent?
   b. How would you interpret the sets of markings on this tape?



Seismogram Tape

2. Identify these seismological recordings:



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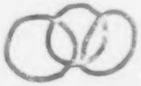
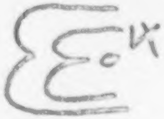


______

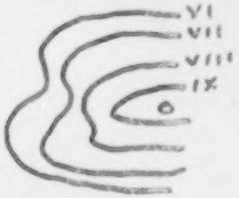


______

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.30 Topic: Diastrophism

Subtopic/Specifications/Content Number *Test Item*

3. Observe the earthquake recording below.
   - a. What does it tell upon a recent earthquake?
   - b. What are these wavy lines called?
   - c. What was the intensity of this earthquake?
   - d. Was this a tremor or major earthquake?
   - e. What does the dot in this recording represent?
   - f. This earthquake occured in a city. What kind of damage can result from an earthquake of this intensity?



Charleston, S. C.
1886

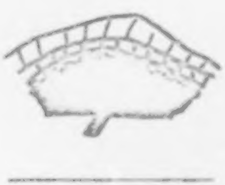
10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.40 Topic: Landforms

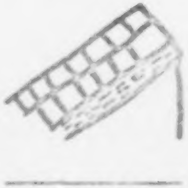
Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.4/10.40a	The student will identify the structional type and origin of sample mountains given.		
*C.6/10.40b	The student will determine the economical value of mountainous areas.		
*B.3/10.40c	The student will determine the geological age of existing mountain ranges.		
D.1/10.40d	The student will formulate a solution to keep mountain resources as natural as possible in the future.		
E.3/10.40e	The student will discuss mountains from an ecological approach with recommendations for corrections.		
*A.1/10.40f	The student will define a plain and plateau, and give an example of each type.		

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.40 Topic: Landforms

Subtopic/Specifications/Content Number *Test Item*

A.4/10.40a 1. Identify the types of mountains sketched below:


1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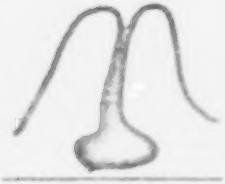
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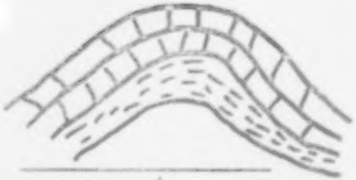

4

2. Make a drawing of the basic types of mountains. Label each type of mountain and describe their structure or origin.
   1. folded mountains
   2. block mountains
   3. volcanic cones
   4. dome mountains

3. Classify the mountains below:

	Location	Type
1. Vesuvills		
2. Sierra Nevadas		
3. Appalachians (newer)		
4. Fujiyama		
5. Rocky Mountains		
6. Blue Ridge		
7. Henry Mountains		

4. The mountains in the western U. S. are formed due to rock fractures and faulting and are called (a) block mountains, (b) folding mountains, (c) dome mountains.

C.6/10.40b 1. List 6 materials obrained from mountains:
1. 4.
2. 5.
3. 6.

EARTH SCIENCE

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.40 Topic: Landforms

Subtopic/Specifications/Content Number	*Test Item*

2. Mountains are economically important to us because of their (a) scenery, (b) skiing possibility, (c) mining of ores, (d) all of the above.

3. Which of the following does not represent an economic value of mountains: (a) mining, (b) cattle grazing, (c) irrigation and electric power, (d) marine industries.

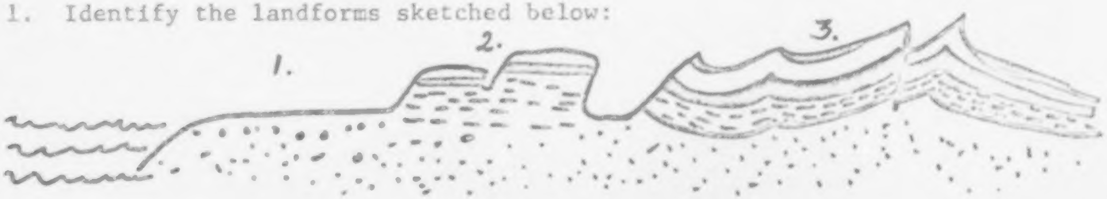
B.3/10.40c 1. Identify the ages of the mountains described below:

_____ 1. This mountain has heavily eroded peaks that look like rolling hills, broad valleys and slow streams.
_____ 2. The needle-like peaks of this mountain are covered with snow. It has deep, narrow valleys and rapid streams.
_____ 3. The tall peaks of this mountain are rounding. The valleys are broadening and supporting well established glaciers (ice fields).

D.1/10.40d No test items submitted.

E.3/10.40e No test items submitted.

A.1/10.40f 1. Identify the landforms sketched below:



1. __________ 2. __________ 3. __________

2. Identify the features of the land forms sketched above.

Landform	Relief	Rock Structure
1. plateau		
2. mountain		
3. plain		

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH

10.50 Topic: Extrusive Igneous Activity

Objectives (**Minimum Objectives)*		*Activities*	*References*
*A.2/10.50a	The student will define volcanism, describe the materials erupted and the forms of energy which cause volcanoes.		
*B.1/10.50b	The student will be able to diagram and label the parts of a volcano.		
*B.1/10.50c	The student will demonstrate his knowledge of the distribution of volcanoes by locating known areas of volcanic activity on a map of the world.		

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH

10.50 Topic: Extrusive Igneous Activity

Subtopic/Specifications/Content Number — *Test Item*

A.2/10.50a 1. List 8 useful products that result from volcanic activity:

1. ________ 3. ________ 5. ________ 7. ________
2. ________ 4. ________ 6. ________ 8. ________

2. True or False:

_____ 1. The stage of activity of a volcano is based upon when it last erupted.
_____ 2. Lava flows from lava plains.
_____ 3. Volcanoes can kill living things with molten lava and poison gas.
_____ 4. Volcanism is a constructive force.
_____ 5. The crater is a crack in the side of a volcano.

3. a. Hot, molten mater, (trapped) in the (deep) (Pockets) far (below) the earth's crust.
b. It contains (minerals), (gases), and (water) (vapor).
c. It (intrudes) into the rock layers of the (earth) in (different) ways.

4. List the four ways in which magma can be trapped:
1. It can force its way up into higher spots - pushing crust upward.
2. It can be trapped far below the rocks.
3. Sometimes it flows into horizontal layers to form a sill.
4. Or it flows into vertical layers to form a Dike.

5. Which of the following is a possible source of heat in an erupting volcano? (a) magma, (b) gases, (c) radioactivity, (d) lava.

B.1/10.50b 1. Diagram and label a volcano, using the following terms: crater, neck, fissure, magma reservoir.

EARTH SCIENCE

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.50 Topic: Extrusive Igneous Activity

Subtopic/Specifications/Content Number *Test Item*

B.1/10.50c 1. Fill in the following chart:

THE WORLD'S BEST KNOWN VOLCANOES

Name	Location	Type
Katmai	ALASKA	EXPLOSIVE
MAUNA LOA	Hawaii	QUIET
MOUNT RANIER	WASHINGTON	Intermediate
Mount Reed	OREGON	Explosive
PARICUTIN	Mexico	EXPLOSIVE
Mount Lassen	CALIFORNIA	EXPLOSIVE

2. Shade in the areas of known volcanic activity on the map below:
(Teacher will provide a map of the world).

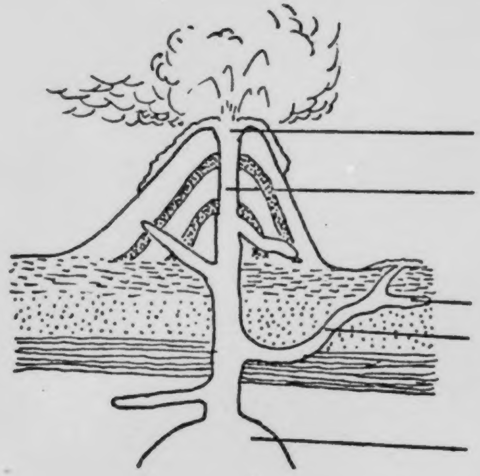
10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH

10.60 Topic: Intrusive Igneous Activity

Objectives *(*Minimum Objectives)*	*Activities*	*References*
B.1/10.60a The student will identify the following intrusive activities: batholiths, laccoliths, stocks, sills and dikes on a cross-section diagram of a volcano.		

10.00 UNIT: INTERNAL FORCES THAT SHAPE THE EARTH
10.60 Topic: Intrusive Igneous Activity

Subtopic/Specifications/Content Number	*Test Item*
B.1/10.60a	1. To the right is a cross section of a volcano. Label the parts shown.



11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.10 Topic: Weathering and Erosion

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*B.2/11.10a	The student will match the term with the meaning of the following terms: weathering, erosion, exfoliation, frost wedging, carbonation, oxidation, hydration, and leaching.		
B.3/11.10b	The student will predict the erosional agent (wind, water, volcanoes, ice, landslides) which is responsible for specific land surfaces.		
*D.2/11.10c	The student will differentiate between chemical and mechanical weathering by devising simple investigations.		
B.3/11.10d	Given a sample of granite, limestone, shale, slate, and mica schist, the student will predict the change agent that will most likely produce the weathering process to form soil.		

EARTH SCIENCE

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.10 Topic: Weathering and Erosion

Subtopic/Specifications/Content Number *Test Item*

B.2/11.10a 1. Mechanical and chemical weathering usually (a) work together, (b) work against each other, (c) never occur simultaneously, (d) change the mineral composition.

2. Matching: Place the letter of the answer to the left of the number.

_____ 1. The removal or moving away of the soil.
_____ 2. Accumulation of rock debris at the base of a mountain or cliff.
_____ 3. When water seeps down through the soil and dissolves minerals as it goes.
_____ 4. When water strips away the entire layer of topsoil slowly and evenly.
_____ 5. The breaking down of rocks.

A. Erosion
B. Gullying
C. Leaching
D. Sheet Wash
E. Talus
F. Weathering

3. Matching: Place the letter of the best answer to the left of the number.

_____ 1. When water seeps into cracks and freezes, expands and finally breaks the rock.
_____ 2. This type of weathering changes the rock into a new type of rock.
_____ 3. This form of weathering causes the rock to split or flake.
_____ 4. This form of weathering does not change the rock, it simply breaks it into smaller pieces.
_____ 5. Loose rock material mixed with humus.

A. Chemical weathering
B. Exfoliation
C. Frost wedging
D. Mechanical weathering
E. Soil
F. Soil creep

EARTH SCIENCE

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.10 Topic: Weathering and Erosion

Subtopic/Specifications/Content Number *Test Item*

B.3/11.10b 1. Match the letter of the force with the land forms they create. You may use these answers more than once.

_____ 1. anticline
_____ 2. cinder cone
_____ 3. sea stack
_____ 4. faulted mountain
_____ 5. folded mountain
_____ 6. lava flows
_____ 7. gullies
_____ 8. landslides
_____ 9. igneous mountains
_____ 10. sand dunes

A. Diastrophism
B. Volcanism
C. Erosion

2. Match each land feature with the correct erosional agent.

_____ 1. Morraine
_____ 2. The Grand Canyon
_____ 3. Talus slope
_____ 4. Dunes
_____ 5. Caverns
_____ 6. Terraces

A. Ground water
B. Ocean waves
C. Gravity
D. Wind
E. Colorado River
F. Glaciers

3. You have just seen a filmstrip which introduces the agents of erosion. The agents are gravity (G), waves (W), running water (R), glaciers (Gl), and wind (Wi). All of the following have something to do with the agents of erosion. Discuss the words in your group and decide which agent is responsible for each of the following. Write the symbols in the blank spaces.
(Teacher will provide the list of terms or statements necessary for task.)

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.10 Topic: Weathering and Erosion

Subtopic/Specifications/Content Number *Test Item*

D.2/11.10c Subordinate Test Items

1. Observe decomposed granite. Compare the grains of quartz to grains of sand. Is there a similarity?
2. Observe samples of feldspar and compare them to a sample of clay. Knowing that clay is formed by decomposition of feldspar, has chemical change occured during the decomposition?
3. Which three conditions make metamorphic rock? (a) heat - gravity - volcanoes, (b) chemical change - pressure - freezing, (c) heat - pressure - chemical change.
4. Breaking up rocks without changing their composition is known as (a) mechanical weathering, (b) chemical weathering, (c) erosion, (d) talus.
5. Give written explanation of the effect of heat energy on rocks.
6. Give a written explanation of the effect of freezing water on rocks.
7. List three gases that aid chemical weathering.
8. Make a list of the ways that water vapor aids in the weathering of rocks.

B.3/11.10d Subordinate Test Items

1. In cold moist climates granite, slate, and mica schist would be most effected by (a) frost wedging, (b) carbonation, (c) oxidation, (d) chemical weathering.
2. In dry climates the most resistant to weathering is (a) mica schist, (b) slate, (c) limestone, (d) granite.
3. In humid warm climates weathering proceeds at a faster rate. The most resistant rock is (a) limestone, (b) slate, (c) shale, (d) granite.

EARTH SCIENCE

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.20 Topic: Soil

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.3/11.20a	The student will list in order the necessary steps in the formation of soil.		
B.1/11.20b	The student will be able to label on a diagram the zones where specific types of soil would be found based on climatic conditions.		
A.3/11.20c	The student will demonstrate his knowledge and comprehension of soil types by classifying different kinds of soil.		

EARTH SCIENCE

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.20 Topic: Soil

Subtopic/Specifications/Content Number *Test Item*

A.3/11.20a 1. List the necessary steps in soil formation:
1. Weathering of bedrock.
2. Weathering and erosion of mantle rock.
3. Formation of immature soil through chemical and mechanical weathering.
4. Mixing of mineral grains with organic matter (humus) to form mature soil.

Subordinate Test Items
1. ______________ causes the breaking up and decomposition of rocks on or near the surface.
2. ____________ soil is found over the original bedrock.
3. ____________ soil has been moved by agents of erosion away from the area where it originally formed.
4. It takes about _____ years for one inch of topsoil to form.
5. The end result of weathering is the formation of ______________.

B.1/11.20b No test items submitted.

A.3/11.20c 1. Write the following types of soils in order of decreasing grain size (from coarsest to finest): silt, clay, loam, gravel, fine sand, coarse sand.
(1) ____________, (2) ____________, (3) ______________, (4) ______________,
(5) ____________, (6) ____________.

Subordinate Test Items
1. Label the parts of the soil profiles:

A - horizon
B - horizon
C - horizon
Bedrock

2. List 4 things found in mature topsoil:
(1) ____________, (2) ____________, (3) ______________, (4) ______________

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.30 Topic: Ground Water

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.2/11.30a	The student will outline in chart form the following information about ground water: source, cause of movement, how it changes the topography of an area.		

EARTH SCIENCE

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.30 Topic: Ground Water

Subtopic/Specifications/Content Number *Test Item*

A.2/11.30a Subordinate Test Items

1. Ground water often develops a Karst type of landscape in areas where the underlying rock is (a) sandstone, (b) granite, (c) limestone, (d) schist.

2. Stone "icicles" which hang from the ceilings of caverns are called (a) sediment, (b) stalactites, (c) magmata, (d) stalagmites.

3. Which of the following rocks absorbs the greatest amount of water? (a) gneiss, (b) shale, (c) slate, (d) sandstone.

4. Ground water affects:
   1. (Surface of the earth).
   2. (Rocks near surface).

5. The amount of water that soaks into the ground after a rain depends upon:
   1. (Size of pores in soil or rock).
   2. (Steepness of slope).
   3. (Kind and amount of vegetation).
   4. (How rapidly the rain falls).

6. Ground water is most evident in (a) rivers, (b) lakes, (c) springs, (d) oceans, (e) bays.

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.40 Topic: **Running Water**

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.4/11.40a	The student will demonstrate the ability to describe how the load of an underground stream is moved, what factors determine the load, and predict the settling rates of the load.		

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.40 Topic: Running Water

Subtopic/Specifications/Content Number — *Test Item*

A.4/11.40a

1. What do we call all of the rocks carried by the stream? (a) carrying capacity, (b) load, (c) deposit.

2. How much a stream can carry depends on (a) the speed of the stream, (b) the type of load, (c) both of these.

3. When water swirls rocks around and grinds out holes in the river bed what do we call these holes? (a) sandbars, (b) sinks, (c) potholes.

4. How does surface water erode rocks? (a) dissolves them, (b) grinds them up, (c) both of these.

5. What happens when a stream slows down? (a) it drops its load, (b) it picks up more rocks, (c) it dries up.

6. Which stream can carry the biggest load? Underline a or b and place a or b in the blank.

   1. (a) V-shaped channel, (b) U-shaped channel ______
   2. (a) large amount of water, (b) small amount of water ______
   3. (a) very steep slope, (b) very low slope ______

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.50 Topic: River Cycles

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.4/11.50a	The student will correctly identify a river's age and characteristics during youth, maturity and old age by the characteristics of each.		
*A.4/11.50b	The student will describe the formation of flood plains, meanders, oxbows and levees during a stream cycle.		

EARTH SCIENCE

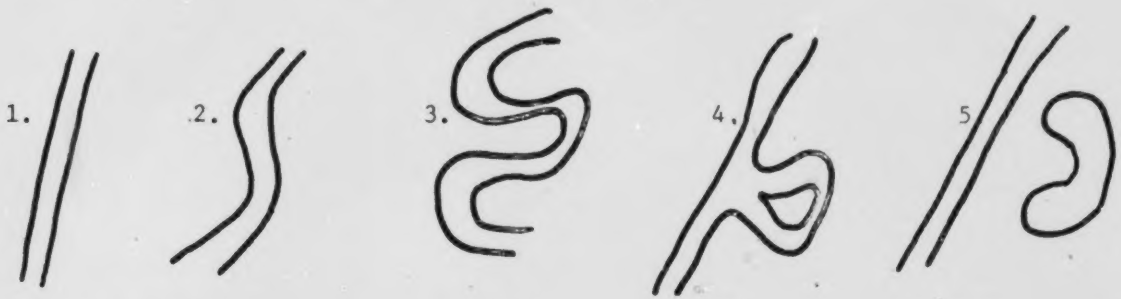
11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
 11.50 Topic: River Cycles

Subtopic/Specifications/Content Number	*Test Item*

A.4/11.50a 1. Indicate whether the following characteristics refer to rivers in their youth (Y), maturity (M), or old age (O):

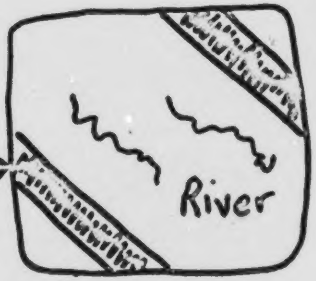
_____ 1. V-shaped valley
_____ 2. Flood plains appear
_____ 3. Waterfalls and rapids
_____ 4. Many oxbow lakes
_____ 5. Canyons
_____ 6. very broad and flat flood plains
_____ 7. Steep gradient
_____ 8. Down cutting of bed
_____ 9. Water flows rapidly
_____ 10. Deltas

2. The drawings below represent the cycle of a stream. Describe what happens and what the conditions are in this series of drawings. Explain fully.

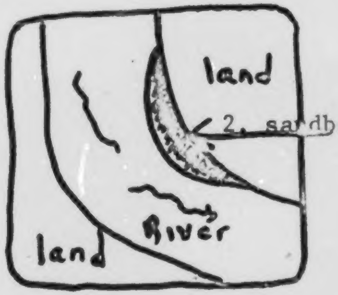


A.4/11.50b Subordinate Test Items

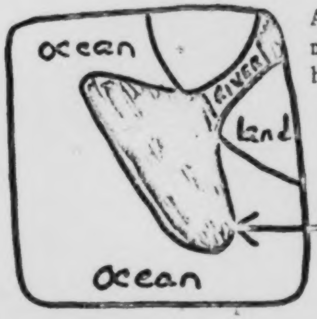
1. Label the following pictures:



1. levee
High
banks
along a
river.



2. sandbar



A triangular deposit made where a river hits a lake or ocean.

3. delta

EARTH SCIENCE

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.50 Topic: River Cycles

Subtopic/Specifications/Content Number *Test Item*

2. Matching. Place the letter of the correct answer in the blank.

_____ 1. A large stream that flows more or less continuously.
_____ 2. All the streams the drain a certain slope.
_____ 3. High ridges that separate drainage basins.
_____ 4. Curves in the river.

A. Divide
B. Meanders
C. Oxbow Lakes
D. River
E. Watershed

3. A stream flowing in a series of S curves is called a (a) levee, (b) meander, (c) cutbank, (d) oxbow, (e) flood plain.

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.60 Topic: Glaciers

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*D.3/11.60a	The student will explain how glaciers are formed and the ways in which they move (regelation, twinning, sliding, etc.).		
D.3/11.60b	Students will show the relationship between climate, elevation and the formation of glaciers.		
*E.2/11.60c	The student will demonstrate his comprehension of glacial erosion and its effect on the topography of an area by making diagrams showing the results.		

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.60 Topic: Glaciers

Subtopic/Specifications/Content Number	*Test Item*
D.3/11.60a	1. Write a paragraph explaining the formation of glaciers.
	2. Explain what happens in regelation? Twinning?
	Subordinate Test Item 1. Glaciers are the result of (a) high altitudes, (b) cold climate, (c) cold, moist air, (d) all of the above.
D.3/11.60b	1. What effect do glaciers have on sea level?
E.2/11.60c	No test items submitted.

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.70 Topic: Wind Erosion and Deposition

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.5/11.70a	The student will explain the concepts involved in wind erosion and deposition on land and along shorelines.		
*E.1/11.70b	The student will demonstrate his knowledge of the factors and sizes of particles affecting the removal of soil and the results of this removal through a scientific investigation.		

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.70 Topic: Wind Erosion and Deposition

Subtopic/Specifications/Content Number	*Test Item*
A.5/11.70a	1. Discuss, with the aid of labeled diagrams, the formation of dunes, their shape, and their migration.
	2. Discuss the surface and climatic conditions that favor wind erosion.
	3. How do you think snow fences aid against beach erosion at Virginia Beach?
E.1/11.70b	No test items submitted.

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE
11.80 Topic: Shoreline Erosion and Deposition

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.1/11.80a	The student will identify the following: offshore bars, splits and hooks and wave-built terraces.		
*E.2/11.80b	The student will diagram at least three features that might result from erosion of the shoreline.		

EARTH SCIENCE

11.00 UNIT: THE FORCES THAT SCULPTURE THE EARTH'S SURFACE

11.80 Topic: Shoreline Erosion and Deposition

Subtopic/Specifications/Content Number *Test Item*

A.1/11.80a No test items submitted.

E.2/11.80b Subordinate Test Items

1. Matching. Use the letter of the correct answer.

_____ 1. This type of coral reef is attached to the land

_____ 2. This is the water in the center of an atoll.

_____ 3. This type of coral reef is in the form of a ring around an island - it is NOT attached.

_____ 4. This type of coral reef has NO land in the center.

_____ 5. This is all the rocks and sand carried foreward by the waves.

A. Atoll
B. Barrier Reef
C. Beach
D. Fringe Reef
E. Lagoon
F. Sandbar

2. A coastal plain is the result of (a) retreating shorelines, (b) flooding rivers, (c) glaciers retreating, (d) iceburgs cutting the shoreline away.

EARTH SCIENCE

12.00 UNIT: THE HYDROSPHERE

12.10 Topic: The Hydrologic Cycle

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*B.2/12.10a	The student will demonstrate his knowledge of the hydrologic cycle showing how water moves from the atmosphere by precipitation and condensation and how water escapes from the hydrosphere or lithosphere by evaporation, run off, infiltration and transpiration from plants.		
A.4/12.10b	The student will describe how the hydrologic processes of condensation, sublimation, precipitation, and melting snow are dependent upon energy transfer.		
*A.2/12.10c	The student will show the ability to correctly recognize the three types of ground water and the characteristics of each type.		
*A.2/12.10d	Students will explain the following: How the water table is formed, water's underground movements and how pollution in ground water occurs.		

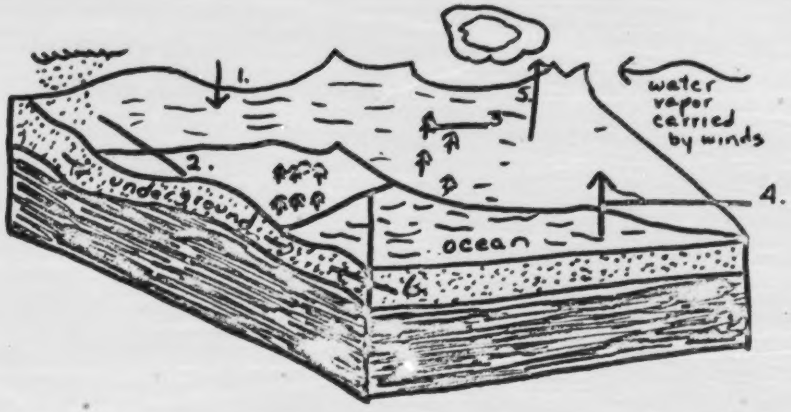
EARTH SCIENCE

12.00 UNIT: THE HYDROSPHERE
12.10 Topic: The Hydrologic Cycle

Subtopic/Specifications/Content Number *Test Item*

B.2/12.10a 1. Below is a diagram of the water cycle. In each space provided, indicate the process occurring at that point. Use the list of words provided.

1. evaporation
2. transpiration
3. condensation
4. precipitation
5. runoff
6. infiltration



2. Draw and label a diagram of the hydrologic cycle including proper inclusion of terms such as
   - a. precipitation
   - b. condensation
   - c. evaporation
   - d. infiltration
   - e. transpiration

A.4/12.10b No test items submitted.

A.2/12.10c True or False - Correct false statements
1. Water which sinks into the ground is called connate water.
2. The top of water-saturated soil is called the water table.
3. The porous rock in an artesian formation is called cap rock.

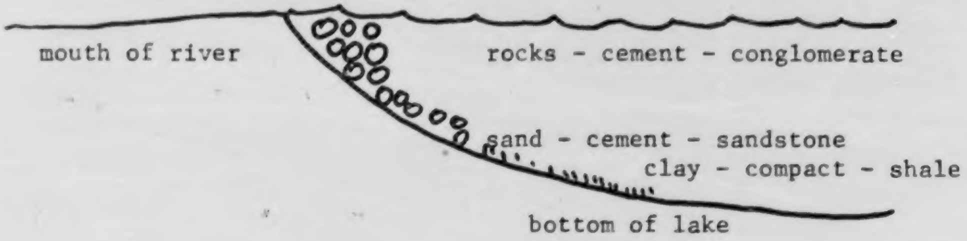
A.2/12.10d No test items submitted.

10.00 UNIT: THE HYDROSPHERE
12.20 Topic: Lakes

Objectives (*Minimum Objectives)		Activities	References
*A.4/12.20a	The student will identify the four basic lake types and describe each.		
*A.4/12.20b	The student will describe how lakes are destroyed (sedimentation, vegetative growth, and when water loss exceeds the supply).		

12.00 UNIT: THE HYDROSPHERE
12.20 Topic: Lakes

Subtopic/Specifications/Content Number	*Test Item*
A.4/12.20a	No test items submitted.
A.4/12.20b	1. Describe how grading in a lake occurs.



12.00 UNIT: THE HYDROSPHERE
12.30 Topic: The Ocean

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.2/12.30a	The student will list the four major disciplines involved in oceanography describing how each discipline aids in understanding the oceans of the earth.		
E.3/12.30b	The student will discuss the theories of the origin of the salts in the water.		
E.1/12.30c	The student will identify the various materials composing sea water through an investigation and relate how these materials may be affected by changes in temperature, pressure, and density.		
*A.3/12.30d	Given a list of oceanographic instruments and a list of uses for oceanographic instruments, the student will select the correct instrument that fits the use.		

12.00 UNIT: THE HYDROSPHERE
12.30 Topic: The Ocean

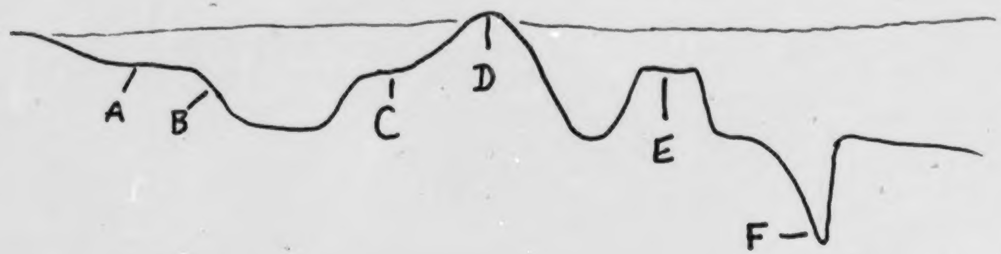
Subtopic/Specifications/Content Number *Test Item*

A.2/12.30a 1. Define the following disciplines as they apply to oceanography:
- a. geology
- b. chemistry
- c. marine biology
- d. physical oceanography

2. Use one or two sentences to explain what each of the following disciplines is about:
- a. Geology
- b. Chemistry
- c. Physics
- d. Biology

3. Ocean Profile: What does each letter represent?

A. ______________ C. ______________ E. ______________
B. ______________ D. ______________ F. ______________



4. Describe each of the topographic features shown in the diagram and associate the corresponding discipline used in oceanography.

EARTH SCIENCE

12.00 UNIT: THE HYDROSPHERE
12.30 Topic: The Ocean

Subtopic/Specifications/Content Number — *Test Item*

E.3/12.30b 1. How did the ocean water get salty?

Subordinate Test Item

1. Rivers which empty into the ocean bring with them dissolved minerals salts. As a result, the salinity of the ocean is (a) increased, (b) decreased, (c) remains the same.

E.1/12.30c Subordinate Test Item

1. The oceans contain dissolved minerals. How do these minerals get into the ocean?

A.3/12.30d 1. Match the oceanographic instrument with its use:

_____ 1. Used to determine how deep parts of the ocean floor are.
_____ 2. Takes samples of layers of the ocean floor.
_____ 3. Used to sample water at different levels.
_____ 4. Measures speed and direction of moving waters.
_____ 5. Used to collect small plants and animals near the surface.
_____ 6. Collects ooze, plants and animals on the ocean bottom.

A. Nansen bottle
B. Depth recorder
C. Plankton net
D. Corer
E. Drag Bucket
F. Current meter

2. Match the instruments below with their use:

_____ 1. water sampling bottles
_____ 2. deep sea thermometer
_____ 3. bottom samplers
_____ 4. current meters
_____ 5. sonic depth recorder

A. determine the speed and direction of ocean currents.
B. instrument used to measure the depth of the ocean.
C. containers used to collect water.
D. device to measure temperature.
E. devices used to sample material on the sea floor.
F. device used to determine pressure at great depths.

Subordinate Test Items

1. Draw and label at least five instruments used in oceanography and explain what each is used for.

2. The modern method of sounding the ocean is determined by an instrument known as a (a) sonar, (b) psychrometer, (c) pump, (d) hygrometer.

12.00 UNIT: THE HYDROSPHERE

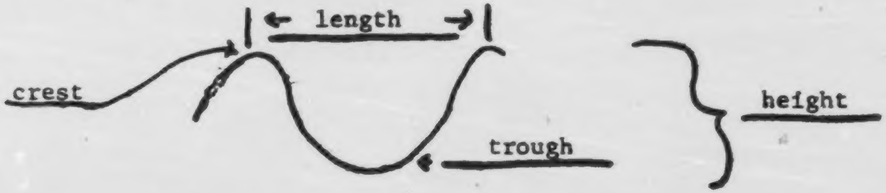
12.40 Topic: Waves

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*B.1/12.40a	The student will label a wave as to its crest, trough, wave length, wave height, and will explain the wave period and the motion of the water particle in a wave.		
*A.1/12.40b	The student will identify correctly the definitions for wave refraction, rip currents, longshore currents, wave erosion, tsunamis, eddies, density and turbidity currents.		
D.3/12.40c	The student will be able to analyze the cause of the erosion at Virginia Beach and give a possible solution to the problem.		

12.00 UNIT: THE HYDROSPHERE
12.40 Topic: Waves

Subtopic/Specifications/Content Number	*Test Item*

B.1/12.40a 1. Label the following diagram of a wave:



A.1/12.40b 1. Match the words with the correct definitions:

_____ 1. wave refraction
_____ 2. rip currents
_____ 3. longshore currents
_____ 4. tsunamis
_____ 5. density

A. Great wave
B. swift currents running away from the shore
C. Weight/unit volume of any material
D. wave approaches at an angle
E. very close and parallel to the shore

2. A giant sea wave which can be 200 miles long and caused by earthquakes on the ocean floor are called which one of the following: (a) tsunamis, (b) eddies, (c) turbidity currents.

3. The natural flow of water that drains off a beach or returns water to the sea is a (a) longitudinal current, (b) undertow current, (c) rip current.

4. Swift currents that return water to the sea or sometimes carry swimmers to deeper water are (a) longitudinal currents, (b) undertow currents, (c) rip currents.

5. Giant waves caused by earthquakes or volcanic disturbances are called (a) tsunamis, (b) breakers, (c) wavelets.

D.3/12.40c No test items submitted.

12.00 UNIT: THE HYDROSPHERE
12.50 Topic: Ocean Currents

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*D.3/12.50a	The student will offer one explanation as to how the following influence currents: wind, temperature, salinity, turbidity, coriolis effect.		
E.2/12.50b	The student will chart the Gulf Stream, North Atlantic Drift, the North Equatorial Current, the Labrador and the Canary current on a map according to the direction in which they flow.		

12.00 UNIT: THE HYDROSPHERE
12.50 Topic: Ocean Currents

Subtopic/Specifications/Content Number		*Test Item*
D.3/12.50a	1.	Write an explanation as to how each of the following influence currents: (1) wind, (2) temperature, (3) salinity, (4) turbidity, (5) coriolis effect.
E.2/12.50b	1.	Using the map provided, chart the Gulf Stream, North Atlantic Drift, North Equatorial Current, the Labrador and the Canary currents according to the direction in which they flow, using red for warm currents and blue for cold currents.

12.00 UNIT: THE HYDROSPHERE
12.60 Topic: Tides in the Ocean

Objectives (*Minimum Objectives)		Activities	References
*E.2/12.60a	Students will demonstrate knowledge of the tides and their relationship to the sun and the moon.		
*D.3/12.60b	The student will determine why this region around Norfolk, Virginia is called Tidewater through the collection and recording of data on the tides influencing our area.		

12.00 UNIT: THE HYDROSPHERE
12.60 Topic: Tides in the Ocean

Subtopic/Specifications/Content Number	*Test Item*

E.2/12.60a 1. On the following diagrams label where high and low tide, and spring and neap tide occurs. Place the sun and moon in the proper position for spring and neap tides.

High and Low Tide

Neap and Spring Tide

2. Place the sun and moon in their relative positions in order to show spring, neap, low and high tides.

Subordinate Test Item .

1. Ocean waters on the side of the earth nearest the moon are attracted more strongly than the solid portion of the earth. The ocean at this time is in (a) low tide, (b) weak tide, (c) high tide, (d) ebb tide.

D.3/12.60b No test items submitted.

13.00 UNIT: THE ATMOSPHERE

13.10 Topic: Characteristics of Atmosphere

Objectives *(*Minimum Objectives)*	*Activities*	*References*
*A.1/13.10a The student will differentiate between the terms: weather, climate and meterology.		
*A.2/13.10b The student will list three major characteristics of each of the four layers of the atmosphere in relation to weather factors, chemical composition, and their ability to support life.		

13.00 UNIT: THE ATMOSPHERE

13.10 Topic: Characteristics of Atmosphere

Subtopic/Specifications/Content Number — *Test Item*

A.1/13.10a 1. Match the following:

A. Meteorology	1. condition of the atmosphere for short period of time.
B. Climate	2. study of weather and the atmosphere.
C. Weather	3. atmosphereic conditions of a long period of time.

2. Define the following terms:
   1. Weather
   2. Climate
   3. Meterology

Subordinate Test Item

1. ______________ is the physical condition of the atmosphere at a given moment or over a short period of time.

A.2/13.10b 1. List 3 major characteristics of each of the four layers of the atmosphere.
   1. Which one contains water?
   2. In which layer do jet planes fly?
   3. Which one is composed of nitrogen?

Subordinate Test Items

1. Make a labeled diagram (cross-section) of the atmosphere, showing all the layers and boundaries.

2. Most of the earth's oxygen and nitrogen is found in the (a) troposphere, (b) stratosphere, (c) ionosphere, (d) photosphere.

13.00 UNIT: THE ATMOSPHERE

13.20 Topic: Factors Influencing Atmosphere

Objectives	(*Minimum Objectives)	Activities	References
*E.1/13.20a	The student will demonstrate his understanding that air has weight and exerts pressure through a scientific investigation.		
E.1/13.20b	Students will indicate an understanding of standard atmospheric pressure and temperature (in millibars and inches, $C^o + F^o$) and the effect of temperature and humidity changes on atmospheric pressure through varied laboratory investigations.		
C.6/13.20c	The student will trace the energy transfer from the sun to the earth and from one earth process to another.		

13.00 UNIT: THE ATMOSPHERE

13.20 Topic: Factors Influencing Atmosphere

Subtopic/Specifications/Content Number *Test Item*

E.1/13.20a Subordinate Test Item

1. We can prove that air has pressure by (a) running, (b) lifting, (c) an instrument called an oxidizer, (d) evacuating a one gallon can of its air by applying heat.

E.1/13.20b No test items submitted.

C.6/13.20c Subordinate Test Items

1. The ocean water is warm in August because it has absorbed ____________ energy from the sun. (a) chemical energy, (b) radiant energy, (c) mechanical energy, (d) electrical energy.
2. All our energy here on earth comes from (a) coal, (b) the sun, (c) oil, (d) the stars.
3. The source of the sun's energy comes from the fusion of _______________ to make _______________.

Ans. Hydrogen, helium

EARTH SCIENCE

14.00 UNIT: CLIMATE
14.10 Topic: Terminology and Problems

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.1/14.10a	The student will identify by definition the following terms: insolation, isotherms, tropical, sub-tropical and polar climates.		
C.5/14.10b	The student will record the conditions that have influenced our climate here in Norfolk, Virginia, for a period of two weeks and graph this data.		

EARTH SCIENCE

14.00 UNIT: CLIMATE
14.10 Topic: Terminology and Problems

Subtopic/Specifications/Content Number — *Test Item*

A.1/14.10a 1. Match the words with the definitions on the right.

_____ 1. insolation
_____ 2. isotherm
_____ 3. tropical
_____ 4. sub-tropical
_____ 5. polar

A. lines drawn on a weather map to connect places having the same temperature at a given time.
B. radiant energy that reaches the earth from the sun.
C. Average temperature of less than 50° F during their warmest months.
D. Average temperature of more than 68° F for the year.
E. Uncomfortably warm summer, ample rainfall.

C.5/14.10b 1. The forecast of May 15, 1973 included: (Teacher will provide forecast)

a. What was the approximate high temperature?
b. What was the approximate low temperature?
c. Name an area of the country where the weather forecast included showers.
d. What was the record temperature high for the Tidewater area?
e. What was the record low of the Tidewater area?
f. What was the chance of rain for 5/16/73?
g. Was the average temperature for the Tidewater area above or below normal for 5/15/73?

2. After collecting weather data for 2 weeks during the month of January, you took a trip to Tampa, Florida and collected weather data there for 2 weeks. What difference might you expect to find with regards to temperature, humidity, barometric pressure, amount and type of precipitation, and cloud type.

14.00 UNIT: CLIMATE

14.20 Topic: Composition of the Atmosphere

Objectives	(*Minimum Objectives)	Activities	References
*E.1/14.20a	The student will perform a simple investigation that proves the presence of one of the four main gases in the atmosphere.		
A.5/14.20b	The student will describe the nitrogen and carbon dioxide cycles.		
D.3/14.20c	The student will explain the carbon dioxide-oxygen-water cycle and its relationship to photosynthesis.		

14.00 UNIT: CLIMATE
14.20 Topic: Composition of the Atmosphere

Subtopic/Specifications/Content Number	*Test Item*
E.1/14.20a	No test items submitted.
A.5/14.20b	1. Describe or diagram the nitrogen cycle. If diagramming, label all parts.
	2. Illustrate and describe both the carbon dioxide and nitrogen cycles. Be sure to explain where man fits into these cycles and what he might do to change them.
	Subordinate Test Items 1. Make a labeled diagram to illustrate the nitrogen cycle. 2. Make a labeled diagram to illustrate the carbon dioxide-oxygen cycle. Explain what is taking place in your diagram.
D.3/14.20c	No test items submitted.

EARTH SCIENCE

14.00 UNIT: CLIMATE

14.30 Topic: Effect of the Sun on the Atmosphere

Objectives *(*Minimum Objectives)*	*Activities*	*References*
B.1/14.30a The student will give practical examples of: angle of insolation, the greenhouse effect, adiabatic temperature changes, heating of land and water, absorption rate of different materials, temperature inversion, daily and annual temperature changes, rainbows and mirages.		

EARTH SCIENCE

14.00 UNIT: CLIMATE

14.30 Topic: Effect of the Sun on the Atmosphere

Subtopic/Specifications/Content Number	*Test Item*
B.1/14.30a	1. Diagram adiabatic cooling.

14.00 UNIT: CLIMATE
14.40 Topic: Water Balance in the Atmosphere

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*E.1/14.40a	The student will explain the energy exchange of water through changes in state such as evaporation, condensation, and solidification by performing simple demonstrations involving these changes.		
B.3/14.40b	The student will demonstrate his knowledge of the relationship of moisture to temperature in the atmosphere finding one variable when the other is given.		

14.00 UNIT: CLIMATE
14.40 Topic: Water Balance in the Atmosphere

Subtopic/Specifications/Content Number *Test Item*

E.1/14.40a 1. The student will explain the changes in state water would go through by melting an ice cube over a burner and placing a pie pan about 12" over the ice cube. (Solid, liquid, gas, back to liquid.)

Subordinate Test Item

1. When ice is changed to water as a result of heating, the motion of the molecules (a) decreases, (b) increases, (c) remains the same, (d) none of these.

B.3/14.40b 1. Having the following hygrometer readings determine humidity from the hygrometer chart.

Dry-Bulb Temp. F	Wet-Bulb Temp. F	Relative Humidity
70°	64°	(72)
80°	74°	(75)
50°	43°	(55)
50°	45°	(68)
60°	51°	(53)

EARTH SCIENCE

14.00 UNIT: CLIMATE
14.50 Topic: Formation of Clouds

Objectives *(*Minimum Objectives)*	*Activities*	*References*
*A.2/14.50a The student will list the conditions necessary for cloud formation and be able to identify the various types of clouds.		
*B.3/14.50b The student will compare and contrast clouds and fog in a class discussion.		

EARTH SCIENCE

14.00 UNIT: CLIMATE
14.50 Topic: Formation of Clouds

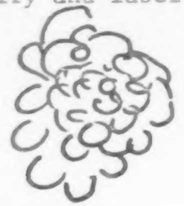
Subtopic/Specifications/Content Number — *Test Item*

A.2/14.50a 1. Match the terms with the correct definitions:

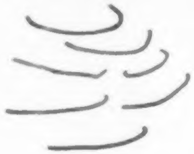
____ 1. low, uniform, sheetlike similar to fog clouds
____ 2. thick, dome-shaped with flat bases vertically developed clouds
____ 3. large, thick towering clouds with cauliflower like tops
____ 4. thin feather-like arranged in bands also called "mare's tails"
____ 5. like patches of fluffy cotton also called "mackerel sky"

A. Stratus
B. Cumulonimbus
C. Cumulus
D. Cirrus
E. Cirrocumulus

2. Identify and label the three basic cloud types below:



a. ______________



b. ______________

c. ______________

3. Which one of the following cloud types has a thick, towering, cauliflower-like appearance and may be found in the Norfolk area during the summer? (a) cirrus, (b) attostiqlus, (c) cumulonimbus.

4. Explain the formation of the following clouds:
a. Stratus
b. Cirrus
c. Cumulus

B.3/14.50b 1. The chief difference between clouds and fog is that (a) fog is thicker, (b) fog forms when water vapor is cooled by contact with a cool surface, (c) clouds always precipitate in the form of rain, (d) there is no difference.

14.00 UNIT: CLIMATE
14.60 Topic: Precipitation

Objectives *(*Minimum Objectives)*	*Activities*	*References*
*A.4/14.60a The student will describe and tell how each type of precipitation is formed.		

EARTH SCIENCE

14.00 UNIT: CLIMATE
14.60 Topic: Precipitation

Subtopic/Specifications/Content Number *Test Item*

A.4/14.60a 1. Describe the conditions necessary for the precipitation in the following forms:
a. rain
b. hail - presence of ice crystals in the cloud
c. drizzle
d. snow

2. Matching:

_____ 1. temperatures above freezing, small drops of moisture coalesce into large heavy drops
_____ 2. Presence of ice crystals at lower temperatures removes moisture from the cloud , crystals grow and fall
_____ 3. Whole droplets freeze due to low temperatures through which they fall.
_____ 4. Frozen droplets of water which add on layers of ice when falling through alternately warm and cold moist air

A. sleet
B. hail
C. snow
D. rain

3. The type of precipitation that is formed when cloud and air are below 32° F is (a) sleet, (b) hail, (c) snow, (d) glaze.

4. When rain passes through a layer of freezing air ____________ is formed. (a) sleet, (b) hail, (c) snow, (d) glaze.

14.00 UNIT: CLIMATE

14.70 Topic: Air Pollution

Objectives *(*Minimum Objectives)*	*Activities*	*References*
D.3/14.70a The student will analyze conditions of the (local) atmosphere and formulate simple methods for cleaning the air.		

14.00 UNIT: CLIMATE
14.70 Topic: Air Pollution

Subtopic/Specifications/Content Number	*Test Item*
D.3/14.70a	1. Name three major polutants of the air. Ans. carbon dioxide, carbon monoxide, nitrogen oxide
	2. Name three major poluters of the air. Ans. automobiles, industry, forest fires
	3. List at least 10 air polluters you can see from the classroom window and state at least 1 method that might be used to erase this item as an air polluter.

14.00 UNIT: CLIMATE
14.80 Topic: Circulation in the Atmosphere

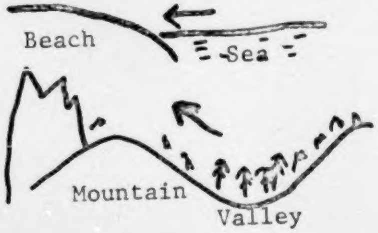
Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.3/14.80a	The student will differentiate between a land breeze, sea breeze, mountain breeze, valley breeze and give the characteristics of each.		
*E.1/14.80b	The student will demonstrate the three types of heat transfer in the atmosphere - radiation, conduction, and convection through the use of simple experiments.		
C.6/14.80c	The student will demonstrate knowledge of the coriolis effect by indicating wind direction as related to the world pressure belts on a map.		

14.00 UNIT: CLIMATE
14.80 Topic: Circulation in the Atmosphere

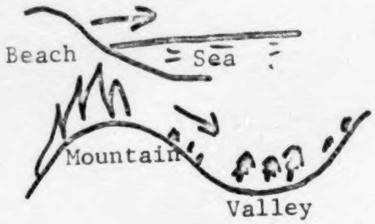
Subtopic/Specifications/Content Number *Test Item*

A.3/14.80a 1. On each diagram below place an arrow indicating direction of breeze:

Warm Day



Warm Night

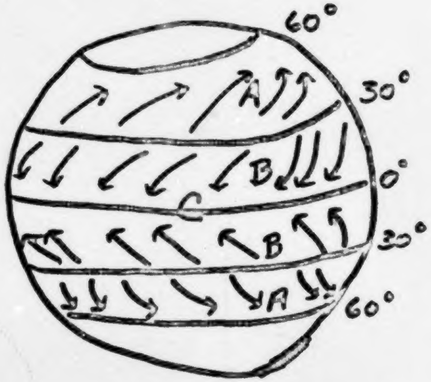


2. Illustrate a land breeze, sea breeze, mountain breeze and valley breeze by drawing pictures of each.

E.1/14.80b No test items submitted.

C.6/14.80c 1. Match each numbered region of the globe with the proper wind.

1. Trade Winds
2. Doldrums
3. Prevailing Westerlies

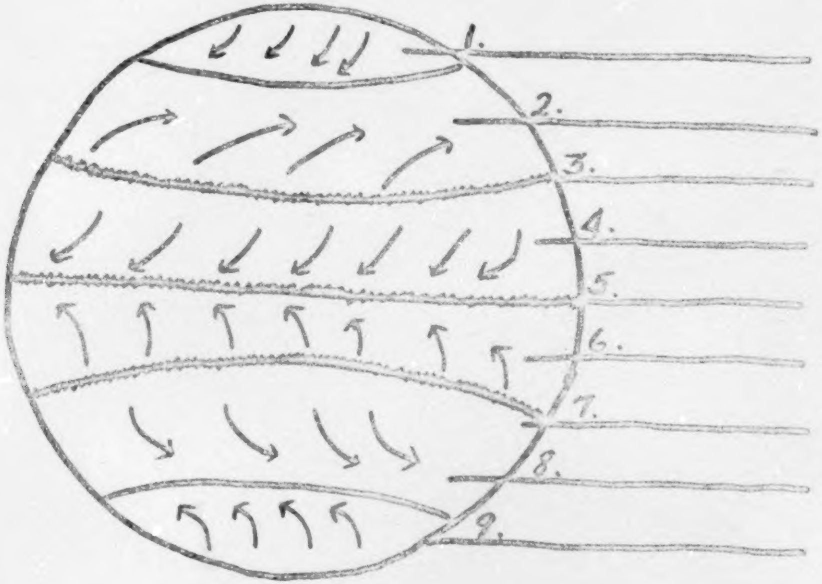


EARTH SCIENCE

14.00 UNIT: CLIMATE
14.80 Topic: Circulation in the Atmosphere

Subtopic/Specifications/Content Number *Test Item*

2. Name all of the world wind belts in the northern and southern hemispheres.



Subordinate Test Item

1. The tendency of objects to defect toward the left in the S. hemisphere is known as the Coriolis Effect. True or False?

14.00 UNIT: CLIMATE
14.90 Topic: Weather

Objectives	*(*Minimum Objectives)*	*Activities*	*References*
*A.2/14.90a	The student will demonstrate his understanding of weather by defining weather and listing properties of the atmosphere that weather includes.		
*B.3/14.90b	The student will compare and contrast the following: warm front, cold front, stationary front, occluded front, anticyclone (highs) and cyclones (lows).		
*D.3/14.90c	The student will interpret a weather map having specific data about weather.		
*D.3/14.90d	The student will demonstrate his knowledge of weather instruments by measuring conditions of air such as humidity, pressure, motion and direction and temperature and recording and interpreting data.		

EARTH SCIENCE

14.00 UNIT: CLIMATE
 14.90 Topic: Weather

Subtopic/Specifications/Content Number	*Test Item*
A.2/14.90a	1. Without the aid of a text book definition, describe in your own words what you think weather means. After you have finished, look at a text book definition. Were you close?

Subordinate Test Item

1. In the circle representing the location of the seven air masses that affect the U. S., write the name of the proper air mass.
(Teacher will provide a map of the U. S. to meet specifications of test item).

B.3/14.90b Subordinate Test Items

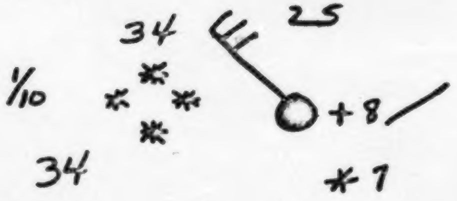
1. Draw a front showing a Polar continental air mass meeting a tropical maritime air mass. What kind of front is this? Use arrows to indicate the direction of the movement of the air masses. Describe exactly what happens and tell how you know what kind of front it is.

2. What conditions make the difference between a cold front and a warm front?

3. Give the symbols for the following:
 1. warm front ____________
 2. cold front ____________
 3. clear sky ____________
 4. overcast ____________
 5. rain ____________
 6. snow ____________
 7. tropical ____________
 8. Polar ____________
 9. maritime ____________
 10. continental ____________
 11. S20 ____________
 12. NE25 ____________
 13. W15 ____________
 14. N30 ____________
 15. partly cloudy ____________
 16. stationary front ____________
 17. centigrade ____________
 18. Fahrenheit ____________
 19. Degrees ____________
 20. High pressure ____________

D.3/14.90c Subordinate Test Item.

1. Put this coded weather report into words which might be given over a radio station. Describe this day as expressive as any announcer would.



EARTH SCIENCE

14.00 UNIT: CLIMATE
14.90 Topic: Weather

Subtopic/Specifications/Content Number *Test Item*

D.3/14.90d Subordinate Test Items

1. A ________________ measures air pressure.

2. At normal pressure the mercury in the tube stands at a height of _____ in.

3. A _____________ determines direction of surface winds.

4. An ______________ measures speed of the wind.

5. A ______________ is a telescopic instrument used to track balloons.

6. Match the following instruments with their function.

_____ 1. thermometer A. indicates air pressure
_____ 2. wind vane B. indicates the humidity
_____ 3. anemometer C. indicates the temperature
_____ 4. hygrometer D. studies the upper atmospheric conditions
_____ 5. rain and snow gauge E. records air pressure
_____ 6. radiosonde F. measures the amount of rain and snow fall
_____ 7. thermograph G. indicates the speed of the wind
_____ 8. barometer H. indicates the direction of the wind
_____ 9. barograph I. records temperature

15.00 UNIT: THE RECORD OF THE EARTH'S HISTORY
15.10 Topic: Determining Geologic Age

Objectives	(*Minimum Objectives)	Activities	References
B.3/15.10a	The student will define stratigraphy and explain how it can be used to determine the relative age of the earth.		
*A.4/15.10b	The student will describe and evaluate the methods of dating the earth such as radioactive dating, salinity of oceans, alteration of rock materials, varves and annual rings of trees.		
*D.3/15.10c	The student will support the principle of uniformitarianism, "The Present is a Key to the Past".		

EARTH SCIENCE

15.00 UNIT: THE RECORD OF THE EARTH'S HISTORY

15.10 Topic: Determining Geologic Age

Subtopic/Specifications/Content Number — *Test Item*

B.3/15.10a 1. What is stratigraphy? How is it used to determine the age of sedimentary rocks?

A.4/15.10b 1. Write a 2 - page report describing and evaluating one of the methods of dating the earth:
Suggestion:
1. Radioactive dating
2. Carbon 14 dating
3. Salinity of Oceans
4. Alternation of rock materials
5. Annual rings on trees

2. Tell which of the following are fossils and justify your answer:
a. a footprint embedded in concrete
b. a tomahawk buried in a mud bank
c. a sharks tooth found to be 5,000 years old
d. an insect preserved in amber
e. sea shells found in Luray Caverns of Virginia
For those that you determine are fossils, describe the environment in which they lived.

3. Why did the early ideas about the age of the earth prove false?

4. Explain what an isotope is and give examples.

5. If you had 3 objects, one young, one middle age, and one very old how would you find out how old they were?

6. Make a drawing showing how we take in C-14.

7. If you started with 100 pounds of uranium how much would be left after 18 billion years?

EARTH SCIENCE

15.00 UNIT: THE RECORD OF THE EARTH'S HISTORY
15.10 Topic: Determining Geologic Age

Subtopic/Specifications/Content Number *Test Item*

D.3/15.10c Subordinate Test Items

1. True or False

_____ 1. The half life of carbon 12 is 5,800 years.

_____ 2. We get carbon 14 indirectly by means of the animals that we eat and some of the plants that we eat.

_____ 3. If you had a rock that was formed during the beginnings of the earth you would use uranium to try and date it.

_____ 4. If you had an object that was about 10,000 years old you would use carbon to find the date.

_____ 5. Man has always had a good idea about the age of the earth.

2. Hutton believed that (a) each geological period between coverings by the sea had its own kinds and rates of processes, (b) what is happening now can explain what has happened in the past, (c) geological history is one series of sudden changes in the surface of the earth, (d) past ways of behavior of the earth are not related to what is happening now.

3. Matching:

_____ 1. V-350	A. earth 75,000 years old
_____ 2. K-40	B. Man speeds up activity
_____ 3. Ruffon	C. nothing
_____ 4. Sollas	D. earth 26 to 75 million years old
_____ 5. U-238	E. Radioactive uranium
_____ 6. Ar-40	F. radioactive uranium turns to this
_____ 7. Pb-206	G. radioactive potassium
_____ 8. Artificial radioactive decay	H. radioactive potassium turns to this

15.00 UNIT: THE RECORD OF THE EARTH'S HISTORY

15.20 Topic: Geologic Time Chart

Objectives *(*Minimum Objectives)*		*Activities*	*References*
*D.3/15.20a	The student will chart the differences in the time eras according to the following specifications: time of duration, characteristics of era and the flora and fauna related to the era in terms of their appearance		
*A.4/15.20b	The student will describe the ways in which unaltered remains of prehistoric organisms were preserved (i.e., natural refrigeration, dessication, and preservation in tar and oil).		

15.00 UNIT: THE RECORD OF THE EARTH'S HISTORY
15.20 Topic: Geologic Time Chart

Subtopic/Specifications/Content Number	*Test Item*
D.3/15.20a	1. Complete the given Geologic Time Scale by referring to the one given in Modern Earth Science, p. 410-411. (The teacher will provide a Geologic Time Scale asking for the era, epoch and period with clues for each.)
	2. Plot the following geologic units of time on the geologic time graph below. (The teacher will provide the time units and the graph).
A.4/15.20b	1. Describe ideal conditions for the formation of fossils.
	2. Complete the chart below by indicating in the spaces beside each of the fossils represented, the possible form of preservation, the era when dominant, probable period or epoch and the environment. (The teacher will provide the chart).
	Subordinate Test Item 1. Why is a tar pit important in the study of the past?